REPORT RESUMES

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AN EXPLORATORY INVESTIGATION OF "SENSORY IMAGE TYPES" IN
FOREIGN LANGUAGE LEARNING. FINAL REPORT.
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THE PURPOSE OF THIS STUDY WAS TO INVESTIGATE THE POSSIBILITY OF THE EXISTENCE OF DIFFERENT SENSORY-IMAGE TYPES IN LANGUAGE LEARNING. A GENERAL QUESTIONNAIRE WAS DEVELOPED WHICH INCLUDED QUESTIONS ON VISUAL AND AUDITORY IMAGERY. THIS WAS ADMINISTERED TO 50 COLLEGE FRESHMEN AND NEWLY ARRIVED AIRMEN AT THE AIR FORCE LANGUAGE SCHOOL LOCATED AT INDIANA UNIVERSITY. FROM THIS GROUP, 18 SUBJECTS WERE SELECTED AND CLASSIFIED INTO FOUR SENSORY-IMAGE, OR LEARNING, TYPES--AUDITORY, PICTORIAL, COMBINED (AUDITORY PLUS VERBAL IMAGE), AND AUDIO-PICTORIAL-VERBAL IMAGE. SEPARATE TEACHING PRESENTATIONS OF THE SAME VOCABULARY AND DIALOGS IN ELEMENTARY GERMAN WERE PREPARED FOR EACH LEARNING TYPE. PRE- AND POST-TESTING WERE COMPLETED ONLY FOR THE FRESHMEN (11). RESULTS INDICATED PICTORIAL PREFERENCE LEARNERS ACHIEVED THE SAME UNDER BOTH THE AUDIO AND PICTORIAL MODE. COMBINED PREFERENCE TYPES SHOWED SLIGHT, BUT INCONCLUSIVE, GREATER LEARNING FROM THE PICTORIAL LEARNING MODE. PURELY AUDIO OR GRAPHIC LEARNER GROUPS COULD NOT BE ESTABLISHED. RESULTS WERE INCONCLUSIVE CONCERNING THE AUDIO MODE. COMPLETE DISCUSSION OF THE STATISTICAL DATA WAS GIVEN AND EVALUATED FOR EACH OF THE 11 FRESHMAN SUBJECTS. (AL)

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Final Report
on An Exploratory Investigation of "Sensory Image Types" in Foreign Language Learning.

NDEA, Title VII, Sml. Grnt. No.: 712127, Proj. No.: 690

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FINAL REPORT

to

The Commissioner of Education

United States Office of Education

Department of Health, Education, and Welfare

Under the Provisions of the Small Grant Program of

Title VII of the National Defense Education Act of 1958 (Public Law 85-864)

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Submitted by:

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Title of Project: An Exploratory Investigation of "Sensory Image Types" in Foreign Language Learning.

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Office of Education

I. PROJECT TITLE: An Exploratory Investigation of "Sensory Image Types" in Foreign Language Learning.

II. PROBLEM: The use of auditory, visual and motor stimuli in foreign language teaching can be traced to the oldest times. Most recently language teachers have been availing themselves of specific visual, motor and auditory stimuli in automatic teaching in order to reinforce the classroom experiences for the learner and to replace certain phases of conventional classroom teaching through programmed learning in the language laboratory. The use of the language laboratory as a teaching machine for individual study (216) has, in general, been confined to the auditory medium of the tape-recorded verbal stimuli. The use of other stimulus and media combinations (verbal, pictorial, auditory, visual and motor) however, has been suggested by Skinner (295, 296), Marty (294a), Mittenecker (212), Richter (261), Bauer (13) and others. Increased concern with pictorial materials justified the reopening of the question of "sensory image" types.

The purpose of this study, thus, was to investigate the possibility of the existence of different sensory image types in language learning. Affirmative evidence should lead to immediate benefits in the designing of language learning programs. Practically, this would mean that in a future language laboratory serving as a teaching machine, Mr. A, who may be predominantly a "visual type" has the chance to use German Elementary (GE) No. I / Visual program, Mr. B who is predominantly an "auditory type" may use GE I / Auditory, and Mr. C who belongs to a "mixed type" may have the chance to use GE I / Combined. All three programs would, of course, have the same teaching objective and cover the same material, the major difference being the emphasis and sequence of different sense stimuli.

As a result of the increased complexity of teaching problems in mass education, the individual capacities of the gifted and the slow language learner need special consideration in individualized programs of auto-instruction and remedial learning. At the same time reliable instruments for testing individual aptitude in foreign language learning are needed. To accomplish these aims, more information about the requisite skills is essential. Studies in aphasia, by emphasizing the primary importance of activities in the central nervous system for processes in thinking and the formation of language behavior (130), (131), (263), suggested that preferential sensory channels or, alternatively, preferential sensory image types, might be developed through differential functioning of the cerebral processes. These combinatory functions which may be reflected in language learning were interpreted as integration processes of individual sensory stimuli and retroactive responses which, if frequently reinforced, influence dynamic language structures (263).

As a result of observations made in teaching foreign languages during the past fifteen years on the basis of previous research in Austria (48), in this country (6a), and in consideration of recent findings in Psycho-Linguistics, the investigator hypothesized that there are definitely different learning types (sensory image types) apparent at different age levels and in different degrees of preference-ability of memory-strength. As early researchers have found (162) and our own observations have supported, these preference types are more stable at the pre-school age, highly fluctuating in the adolescent age, and again considerably stabilized at maturity*.

This project was initiated as the result of the investigator's attempts in research and in practical experience of the last decade to find an improved analysis of some yet unknown factors in the complex process of language learning from S (stimulus) via O (organism) to R (response). The need for this analysis has been stressed by Coulson and Silbermann, Osgood, Hebb, Penfield in recent literature and was an early topic of research in Wundt's, Meumann's, and Stern's studies in the last and at the beginning of this century. While studies in the early decades investigated psycho-physical capacities of the individual but suffered from deficiencies in design and could not consider interactions with modern forms of stimulation, many recent research studies centered around the modern technical forms of sensory stimulation but neglected the O in an almost "empty organism"-approach or generalized conclusions about O in a too one-sided way.

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*Whether we assume that these sensory preferences in individuals can be consolidated into real "sensory image types" or not is not the crucial question. Our problem is whether these dominances are strong enough and significant enough for the perception-communication circle in foreign language learning to influence performance. If they do we must try to help the organism in programed learning for the gifted as well as in remedial learning for the under achiever. New teaching machines like the "Empirical Tutor" (99a) and others nowadays can consider these dominances if we develop a theory of language programing which considers these individual differences and individual machine responsiveness correlated with them. Tentative extablishment of "sensory image types" may be a step towards this new theory for language learning even if there are no pure types but only predominances or physiologically based defects. The programer in cooperation with the language teacher who supervises and evokes Hockett's "sixth Function" (137) will have to elaborate on the minutest symptoms rather than generalize types of the highly differentiated individual with a certain predominance. The theorist to whom this exploration is supposed to give basic clues will have to define linguistic learnemes or minimal units which can be correlated in order to be programed. Pike has suggested this segmenatation elsewhere (242). What we eventually need is the establishment of Visemes (Pictoremes or Ikonemes as well as graphemes) Audemes Kinemes and Motoremes (Graphemes) which can be built into our complex program as ancillary aids and flexible adjustments to machine learning in order to provide for dominant learnemes which appeal to the individual's needs in accordance with his or her preference.

Modern developments in auto-instruction and programed learning have necessitated increased concern with a thorough analysis of the Organism. Behaviorism has felt the "missing link" not only because of the insight that psycho-physical findings in medical and bio-linguistic research have made contributions but also because the changed individual of our audio-visual age is facing increased complexities of interaction, intraverbal behavior and operants. These complexities might very well cause increased exposure of physiologically or habit-based preferences or defects in imagery. Tolman has referred to the importance of these differences in imagery (3/8) and very recent studies in Stereotypy of imagery have suggested their existence (123a). Therefore it seemed sensible to design investigations with special consideration of the needs of the organism in a modern milieu of S-R reaction. Modern technology in the meantime has developed machines which can be adjusted to these needs in such a way that they individualize learning.

They individualize learning for the so called "gifted" as well as for the many degrees of the "poor", backward or less efficient learner. Both terms of course are highly ambiguous--especially in language learning, since, as Thurstone has suggested, intelligence is not necessarily a correlate of "giftedness" in language learning.

Although research has proved a frequent correlation of intelligence quotients with language ability scores our still young field of testing language ability, language achievement and especially long range retention is faced with many undeterminable factors based on physiological abilities and preferential attitude-forming experiences of a cultural as well as of an individual type.* (viz. forward movement in American speech sounds vs. backward movement in German speech sounds and certain individual differences caused through audile, visual, and kinaesthetic variations and defects.) Burt, (47a) after having collected thousands of test results, maintains that sensory imagery does vary greatly and preferences can clearly be established. There can be no doubt that in a culture like the American where the general pattern already puts limitations and special variations on gestures and pitch in language behavior and where certain arche-phenomena of behavior are conditioned by the length and diphthongization of half-closed vowel, visual audile, or kinaesthetic preferences have to be utilized to their full extent in learning a foreign language. As Burt holds, we do not know how much of these visual or audile predominances are innate or habit-conditioned. Increased engagement in research in media and methods which consider predominances and individual differences thus seems mandatory.

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*Notwithstanding the constancy of connotative meanings in a speech community (Osgood 1952 a) or even of archetypal symbols in large portions of mankind in empirically associated images which are caused by the structure of language behavior, the forms and types of imagery in the individual have remained different. --Wheelwright, Ph., Metaphor and Reality, Indiana University Press, Bloomington 1962, pp. 111-128.

Related Research: Analysis of sensory image types of learners was an early topic of research in the exploration of the capactiy of the mind of the child. Netschajeff (221), Pfeiffer (239), and Kemsies (162) reported that the children in the first ten years of school seem to be mainly of the visual type. Meumann (203) hypothesized that most people are visual types in their "object-images" and are auditory-motor types in their "verbal images". Watkins, Pfeiffer (239), and Meumann (203) held that the visual image types seem to prevail among female persons throughout life, although Lobsien (187) claimed that auditory types could be found as frequently among girls as among boys. Pfeiffer has retested pupils over a period of three years and found that there were no significant changes in the sensory image types to which the pupils were categorized.

With regard to psycho-physical capacities of the adult language learner, the studies of Lay (179), Netschajeff (221), Lobsien (187), Kemsies (162), Carr (53) and others indicated that although imagery types are stabilized in adults to some extent, they still exist. Pavlov thought that people could be classified in accordance with the relative dominance of the "first signal" system (that of the senses in general) or the "second signal" system (that of speech) (311). Among more recent studies, Dunkel (96), Mowbray (217), and Armstrong (2) have investigated learning and retention effected through auditory and visual imagery and a Russian study by Chistjakova (68) points out that pictorial stimuli brought relatively better results in memorization of foreign language vocabulary.

Kimble has shown that individual differences in reaction times of various sense modalities can be measured. The reaction time-spans ranked decreasingly in this order: 1. Tactile, 2. Auditory, 3. Visual (163).

With regard to reaction capacities of different sensory image learners of foreign languages, Kemsies' experimentation has been the most valid and conclusive one in the study of the learning process. (162) The results of his studies showed a strong dominance of combined sensory modality in measuring effectiveness. Contrary to Lay (179) he believed, though, that the visual modality, with deprivation of the auditory, results in the lowest effectiveness.

Research on single and multiple channel communication in language teaching has been highly inadequate and contradictory. While the extensive research on film in America and England seems to have substantiated the assumption that multiple-channel input results in high efficiency of recall, observations and experiments in Austria and France (351) showed superiority of visual channels versus audio-visual for high school subjects. The investigator's own research on achievement in foreign language learning through audio and audio-visual aids has shown that the use of visual aids in the form of colored slides correlated with textbook lessons and tapes has increased the short-range retention of vocabulary and speech patterns, but has not effected an increase in the long-range retention. (13) This seems to prove that the audio aids in language learning have a stronger impact on the memory and increase the long-range retention comparatively more than visual aids. Yet these visual aids do increase the motivation of students learning a foreign language and should, therefore, be used in a way which does not deprive them of time which can be utilized better for audio drill. The constant availability of these visual aids a a "background aid" to the audio-teaching situation should be encouraged whenever and wherever possible. The character of this background aid should not be a sporadic one, but the aid should be effectively integrated into the learning program so that the students will become accustomed to it.

Many studies on the comparative effectveness of pictorial versus audio and graphic (158a) (126) (217) (191) in attempting to show a superiority of certain channels over others, cannot prove any general superiority because the basic objective of these studies is to complex and fails to sort out the different variable factors in the individuals of the subject population. The summarical statistical results on subjects with equated personality qualifications do not consider the fact that these results are composed of variable factors represented in different learning types. If Creore and Hanzeli (81) compared the effectiveness of the audio-lingual method supplemented by special color slides with that which made no use of the A-V slides their results also suffer from the disregard of learning types as much as Ebbinghaus' (162) memory studies already did. In both results several groups of individuals were pooled together and the complex result figures do not give us any indication as to the individual factors of individual learners. If Asher's study (2a) tries to demonstrate that adults learn foreign languages better visually than auditorily this generalization again does not prove more than the representation of a certain habit-strength acquired by individuals systematically since the first day of their schooling when the graphic symbol became substantial in ideational as well as in mechanical processes. Kale and Grosslight's results (158a) as well as those of Bern (17) and Lumsdaine (191) as valuable as they are, again are based on the assumption that one single or even several modes of presentation are superior to another, or a number of others, in foreign language learning. This does not seem to be true in all instances because every individual learner is different and we can only aspire to find similarities of individuals which can be subsumed under certain characteristics of groups of types of learners. Therefore, also studies like those of Pimsleur (245) would have to consider individual psychological and physiological abilities and individual preferences before any question of sequence and transfer can be considered. The necessity of efficient consideration of individual differences is also stressed by Marty (294a, p. 15). It is certainly highly probable that different media have common cues of generally similar stimulus-strength which justify their sequencing and their quantitatively pre-directed and uniform application in group-teaching or in mass-communication programs as it has proved valuable for example in the ASTP. However, if we want to develop highly effective programs for auto-instruction and remedial learning, we have to consider the characteristics and abilities of individual learners and establish basic principles for group similarities. These then will enable us to aid the learner in those skills in which he is most deficient, and reward him in those skills in which he is strongest on the basis of results of prognostic tests. Since our primary objective in language teaching is the speaking ability, a study in the basic channels of communication-strength must therefore consider the role of different sense modalities in the process of acquiring speaking ability. For this reason future research should attempt to test, for example, not so much the ability to conceive pictorial images in order to reproduce the same or select them in multiple-choice type tests but rather to test in how far the sequenced and segmented pictoreme or grapheme can better facilitate phonemic, morphemic or syntagmemic production of the linguistic target units. In order to establish a fair learning and testing procedure in all sense modalities, we, therefore, will have to create strictly identical systematic learning and testing procedures of lingual as well as pictorial, graphic, and kinestetic learning units or "learnemes" (minimal learning units). This can be achieved by creating standard pictorial, graphic and kinestetic units represented in frames which are in their form-analysis correlated with the linguistic audio-lingual units.

III. OBJECTIVES:

The objectives of this study were to develop and demonstrate:

(1) An analysis of the three "sensory image types" (visual, auditory, and combined) in foreign language learning (German Conversation on the Elementary level). The Visual type was originally hypothesized as a pictorial-preference type only. The considerable effect of learning practices acquired through conventional teaching and normal school experience on visual conceptualization through graphic symbols led the investigator to include a fourth learning- and testing -mode in the investigation -- that of the Audio-Verbal Image type presentation. (SEE IV. A. 2)

(2) An analysis of the effectiveness of three individualized programs in relation to the four sensory image type groups of learners. These programs were developed in Elementary German Conversation. (See p. 28 - 31, Lists 2A - 2D).

In addition to these two objectives, valuable conclusions on linguistic and extra-linguistic factors in language learning could also be found. (See V, p. 32, VI. p. 71 - 74, p. 121 - 123; and Retention Charts in Appendix).

IV. PROCEDURE

A. General Method:

1. A General Questionnaire including questions on visual and auditory imagery (individual psycho-physiological abilities and preferences, learning modes and previous experiences in foreign language learning and contact with the culture of the foreign language learned) was designed and administered to fifty college freshmen and newly arrived students of the Air Force Language School located at Indiana University who had not had any previous training in any foreign language. The subject population of eighteen students was selected on the basis of the results of this questionnaire. (Equation in age, no foreign language training or experience, at least a C plus grade in English and Mathematics).

Whereas the pretest for classification of the students in preference groups (Phase 1) was administered to the whole group of 18 students (the 11 freshmen and seven Air Force language students) the post-test investigating the effectiveness of different learning modes on demonstrated student preferences (Phase 2) could only be administered to the 11 college freshmen because the Air Force language students were not available for the post-test procedure due to a number of scheduling difficulties. Since the teaching and testing procedure required a strict time schedule, a deviation from this schedule would have contaminated the procedure and invalidated results.

2. In preparation for the Pre-test Procedure, four series of foreign words were taught to the subjects using the following modes of presentation:

(a) Auditory presentation of the foreign word and its English equivalent, without visual presentation (audio-type)

(b) Auditory and pictorial presentation of the foreign words without explanation in English (pictorial type).

(c) Auditory presentation in the foreign language and in English plus presentation of the verbal image of the foreign word (verbal image type)

(d) Auditory presentation in the foreign language and in English combined with presentation of the object image as well as of the verbal image (audio-pictorial-verbal image type; combined). All four modes of presentation represent practical situations in the language learning process as they appear in modern audio-visual language teaching programs. Visual presentation was given with the same standardized pictorial teaching materials issued by the Audio-Visual Materials of the Austrian Ministry of Education (feltboard series) and specially developed sets of slides and graphic charts for teaching machines (developed by the principal investigator in the ~~pilot~~ project). Each vocabulary word was learned by one of the 4 instructional methods.

The Audio-Verbal Image type presentation, as described in (2c), was not included in the original plan of the project but was added in order to investigate the function which the verbal image stimulus has in memorisation and its relationship to pictorial image memorization within the assumed group of visual-type learners. The leading criterion in this connection was the question whether auditive preference types would be helped by the additional visual presentation of verbal images and whether visual types would demonstrate different results in full and partial retention when being presented with pictorial material and with verbal image material.

3. Testing Procedure of Phase 2 (Post -Test Procedure)

During the two learning periods of Phase 2, each student was taught six dialogs (3 minutes each, with pauses and two repetitions). Each learning period lasted about a week and consisted of three sessions on alternate days. In this learning period each student was taught three different dialogs which were presented three times each session. Throughout the learning period each student was taught a given dialog in only one mode. (cf. List 2A, 2B)

At the end of each learning period, the students were tested on the three dialogs they had learned during that period. Each test consisted of twelve questions with the following specifications:

(a) There were 3 questions on the content of the dialogs, one for each dialog.

(b) There were 3 questions taken out of the dialog, requiring a response learned in the dialog, one per dialog.

(c) There were 6 items containing parts of utterances, which served as cues for completion according to previously learned sequences, two per dialog.

(d) The students were tested individually by a testing borad of two linguists and two language teachers. Each student was questioned by the instructor who had taught him during that learning period.

(e) The questions pertaining to any given dialog were accompanied by the respective medium wherein the student had learned the dialog; i.e. M1 -- pictorial presentation, M2 --- graphic presentation; M3 -- combined.

(f) In order to eliminate the effect of sequence on memory (as an additional independent variable), the order of test questions was random (cf. tables on RETENTION SCORES ACHIEVED THROUGH DIFFERENT MODES OF INSTRUCTION, Students # 1 - 11.

From the twelve questions in each of the two tests four questions were asked in each of three different modes.

Example: Phase 2, Student 1

A. Student # 1 was taught Dialog I,1 (Am Bahnhof) in Mode 3 (= Combined) and tested on Dialog I,1 in M3 (i.e. questions # 3, 5 , 7, 8 were asked with the accompanying use of both graphical and pictorial media).

B. Student # 1 was taught Dialog I,2 (Im Lebensmittelgeschäft) in M1 (= Pictorial) and tested on Dialog I,2 in M1 (i.e. questions #2, 6 , 9, 10 were asked with the accompanying use of pictorial media).

C. Student # 1 was taught Dialog I,3 (Im Restaurant) in M2 (= Graphic) and was tested on Dialog I,3 in M2 (i.e. questions # 1, 4, 11 , 12 were asked with the accompnaying use of graphic media).

D. TESTING MATERIALS:

(a) Phase 1:

In the first phase the testing materials consisted of 120 words denoting articles of the house, clothes, plants and parts of the body which are common in both cultures, that of the learner as well as that of the foreign language. The leading criterion in the choice of German vocabulary selected for the pilot project on sensory image types in foreign language learning was the appropriate structure of the word representing specific linguistic difficulties which were equated in all four groups of words. Frequency of occurrence of these words in the vocabulary of a native speaker of German was no criterion; however due care was taken to translate these into commonly used English which would be known by all subjects.

b) Phase II:

(1) (Conversation Lessons I) In the second phase a series of three elementary German units (conversation lessons on every-day situations) were taught and reinforced through practice with the teaching machines---using the four instructional techniques outlined above. Each lesson was administered using each technique to counterbalance any differences in difficulty. Mastery of the language patterns taught in the Vocabulary Section and in Conversation Lessons I were evaluated.

(2) (Conversation Lessons 2) On the basis of the results of the pilot and pre-test procedures (A,B above), subjects were categorized into four groups of sensory image types: Auditory, Pictorial-Visual, Graphic-Visual (Verbal Image-Types), and Combined. These four categories were then exposed to three new learning units and were given a post-test on pronunciation, content, structural knowledge, and speaking ability (defining "mastery" of conversation). The only criterion of testing and measurement was the verbal response of language behavior. The results of the pretest procedure and of the post-test were then analysed.

(3) In general, the following commonly recommended principles were observed in the development of the program:

(1) Gradual development of a segmented learning program (i.e. in the visual program as much as in the auditory program.

(2) Learning procedure from part to the whole.

(3) Interruption element (working time on the teaching machine was limited to individual standard working periods).

(4) Reinforcement element (repetition in general three times with verbal and/or pictorial images).

(5) Element of realité (all pictorial stimuli as well as the auditory are resembling or identical to those in the original teaching situation in the classroom).

(6) The element of "construction" in preference to that of interpretation and recognition (vid. Skinner type versus early Pressey type teaching manhine).

(7) The motor-element of verbal response.

C. DATA

The data for the proposed study consisted of scores derived from the pre- and post-tests indicated by errors classified according to the following language spheres:

1. Pronunciation (accuracy of phonetic and phonemic units)
2. Content (vocabulary,patterns)
3. Structural knowledge (applied grammar)
4. Speaking ability (time criterion of response)

D. ANALYSIS OF DATA:

A "treatment of x level" design was used in this study, the major purpose of the design being to increase the precision of the comparison among programs by pre-selecting the treatment groups with reference to the presumed "sensory image" variable. Main effects of, and interaction among, sensory image types and their specially designed programs were examined by analysis of variance. The results of the pre-test procedure were analyzed on the basis of:

1) Individual word scores achieved in the 4 word tests

2) Test words ranked by degree of difficulty as represented in frequency of non-retention and partial retention

3) Frequency distribution of scores

4) Total scores, means and individual and group retention indices

5) Full and partial retention of words in the four quartile ranges of achievement (based on retention indices achieved by subjects in a selection of 88 words which showed an optimal degree of equation in linguistic difficulties.

I. Linguistic Criteria

A. Phonology

The pronunciation was evaluated on the basis of one mistake per one mispronounced phoneme. Certain substitutions, such as English "r" for German "r", "šp" for /sp/ and /št/ for /st/ were not considered erroneous.* A certain leeway was permitted for vowel allophones, i.e. as long as a vowel did not contrastively belong to the territory of another German vowel, it was considered correct even if marginal. For example, the word /štil/ vs. /štɪl/.

B. Morphology

1. In cases of consistent wrong agreement only one mistake was counted, for instance feminine article and adjective before a non-feminine noun.
2. In cases of wrong selection of case inflection two mistakes were counted if differing selections were displayed. For instance, "eines neue Hut," i.e. genitive singular masculine of "ein" and accusative singular feminine of "neu" before the masculine "Hut."
3. If both mistakes occurred in the same word they were assigned only one point. For instance, "unter das Lampe:" wrong case after "unter" and wrong gender.
4. Incorrect application of tense was considered a mistake separate from the ones assigned to errors in morphological structure.

C. Syntax

Each mistake in word order was assigned one point. Most mistakes were made by reversing the sequence of sentence parts or by placing the separable particle in the wrong slot. Example: "Er steigt ein in den Autobus" instead of "Er steigt in den Autobus ein."

II. Contextual Criteria

The evaluation of contents was based on correctness with reference to the specific situation in the learning unit. Each test consisted of three such units. No number scores were assigned; the answer could only be either right or wrong. Slight intelligible deviations within the scope of the unit were considered correct. Example: "Herr Schulz möchte das kalb (instead of "den Hof") Sehen."

Note:

Non-answers, structurally incomplete or unintelligible answers were assigned their mistake value on the following basis. The objective answer as laid down in the unit comprises the maximal number of mistakes; each phoneme constitutes one point as to morphological structure. Content has no gradation and accordingly was assigned one point wheth er wrong or absent.

In the charts referring to phase 2 (test 1 and 2), Morphology and Syntax are not separately listed but combined in one column called Structure.

Word List of Test I

(Audio-type)

	WORD	SCORE VALUE
1.	Topf	4
2.	Mütze	4
3.	Schweif	4
4.	Riemen	4
5.	Stiel	4
6.	Wipfel	5
7.	Strauch	4
8.	Küche	4
9.	Brett	4
10.	Schneide	5
11.	Wand	4
12.	Rübe	4
13.	Kleid	4
14.	Baum	3
15.	Weiche	4
16.	Stirne	6
17.	Faden	5
18.	Rauch	3
19.	Wange	4
20.	Rasen	5
21.	Kerze	5
22.	Blatt	4
23.	Wolke	5
24.	Kragen	6
25.	Sparre	5
26.	Holzscheit	8
27.	Oberschenkel	9
28.	Schürze	5
29.	Messer	5
30.	Schnauze	5

Maximum Total Score Value...141

Word List of Test II

(Pictorial-Type)

	Word	Score Value
1.	Schornstein	8
2.	Schnalle	5
3.	Schwanz	5
4.	Schüssel	5
5.	Tüte	4
6.	Blüte	5
7.	Stiefel	5
8.	Spange	4
9.	Strumpf	5
10.	Sprosse	5
11.	Korb	4
12.	Kralle	5
13.	Klingel	6
14.	Loch	3
15.	Deichsel	5
16.	Rock	3
17.	Riss	3
18.	Rodel	4
19.	Bauch	3
20.	Strickstrumpf	9
21.	Zaun	3
22.	Schirm	4
23.	Fichte	5
24.	Kirche	5
25.	Hals	4
26.	Ast	2
27.	Kloss	4
28.	Sessel	5
29.	Mantel	6
30.	Fensterladen	10

Maximum Total Score Value 144

Word List of Test III

(Verbal Image-Type)

	Word	Score Value
1.	Stimme	.5
2.	Braten	.6
3.	Zug	.3
4.	Spritze	.6
5.	Tölpel	.6
6.	Schopf	.3
7.	Aberglaube	.9
8.	Riese	.4
9.	Strahl	.5
10.	Gewissheit	.8
11.	Schlips	.5
12.	Metzger	.6
13.	Schöpfung	.5
14.	Recke	.4
15.	Klampfe	.6
16.	Zettel	.4
17.	Gicht,	.4
18.	Schwelle	.5
19.	Kringel	.6
20.	Salbe	.5
21.	Wicht	.4
22.	Böller	.5
23.	Wanze	.5
24.	Schlauch	.4
25.	Karzer	.6
26.	Streich	.5
27.	Lücke	.4
28.	Schubfach	.6
29.	Dorf	.4
30.	Hirsch	.4

Maximum Total Score Value 152

Test Words

Test IV (Audio-pictorial-Verbal Image Type)

	Word	Score Value
1.	Maserung	7
2.	Zopf	3
3.	Absatz	5
4.	Docht	4
5.	Dach	3
6.	Teller	5
7.	Tasche	4
8.	Haube	4
9.	Balken	6
10.	Gabel	5
11.	Pantoffel	8
12.	Jäger	5
13.	Schnabel	6
14.	Schnur	4
15.	Schleife	5
16.	Rücken	5
17.	Kübel	5
18.	Nüstern	7
19.	Stengel	6
20.	Speiche	6
21.	Span	4
22.	Strampelhose	12
23.	Kopf	3
24.	Kranz	5
25.	Krug	4
26.	Latz	3
27.	Dolch	4
28.	Rute	4
29.	Rist	4
30.	Reifen	5

Total Score Value. . . . 151

Phonemic Score Values of Test Words

TEst I	Test II	Test III	Test IV
Score Value: 8-12			
(26) Holzscheit	(1) Schornstein	(7) Aberglaube	(11) Pantoffel
(27) Oberschenkel	(20) Strickstrumpf	(10) Gewissheit	(22) Strampelhose
	(30) Fensterladen		
Score Value: 6-7			
(16) Stirne	(13) Klingel	(2) Braten	(1) Maserung
(24) Kragen	(29) Mantel	(4) Spritze	(9) Balken
		(5) Tölpel	(13) Schnabel
		(12) Metzger	(18) Nüstern
		(15) Klampfe	(19) Stengel
		(19) Kringel	(20) Speiche
		(25) Karzer	
		(28) Schubfach	
Score Value: 5			
(6) Wipfel	(2) Schnalle	(1) Stimme	(3) Absatz
(10) Schneide	(3) Schwanz	(9) Strahl	(6) Teller
(17) Faden	(4) Schüssel	(11) Schlips	(10) Gabel
(20) Rasen	(6) Blüte	(13) Schöpfung	(12) Jäger
(21) Kerze	(7) Stiefel	(18) Schwelle	(15) Schleife
(23) Wolke	(9) Strumpf	(20) Salbe	(16) Rücken
(25) Sparre	(10) Sprosse	(22) Büller	(17) Kübel
(28) Schürze	(12) Kralle	(23) Wanze	(24) Kranz
(29) Messer	(15) Deichsel	(26) Streich	(30) Reifen
(30) Schnauze	(23) Fichte		
	(24) Kirche		
	(28) Sessel		
Score Value: 4			
(1) Topf	(5) Tüte	(8) Riese	(4) Docht
(2) Mütze	(8) Spange	(14) Recke	(7) Tasche
(3) Schweif	(11) Korb	(16) Zettel	(8) Haube
(44) Riemen	(18) Rüdel	(17) Gicht	(14) Schnur
(5) Stiel	(220 Schirm:	(21) Wicht	(21) Span
(7) Strauch	(25) Hals	(24) Schlauch	(25) Krug
(8) Küche	(27) Kloss	(27) Lücke	(27) Dolch
(9) Brett		(29) Dorf	(28) Rute
(11) Wand		(30) Hirsch	(29) Rist
(12) Rübe			
(13) Kleid			
(15) Weiche			
(19) Wange			
(22) Blatt			
Score Value: 0-3			
(14) Baum	(14) Loch	(3) Zug	(2) Zopf
(18) Rauch	(16) Rock	(6) Schopf	(5) Dach
	(17) Riss		(23) Kopf
	(19) Bauch		(26) Latz
	(21) Zaun		
	(26) Ast (2)		

Measurement of Errors

The purpose of phase 2 was to demonstrate a possible correlation between preferential learning modes shown in the results of both phases. Retention indices of the word tests (phase 1) and the tests on syntactical units thus were supposed to reveal a possible existence of sensory image types in learning. Since all subjects were exposed to all learning procedures applied, carry over of preference was ruled out. While, on the one hand, the application of the same method of evaluation was not only impossible, it was even unnecessary because the correlation was not based on numerical values. While the first four tests of phase 1 served to establish an existence of identifiable learning types, the only criterion of comparison was the performance of these learning types in memorizing syntactical units under identical conditions of learning. Therefore measurement in phase 2 takes into account only the true-false dichotomy as to pronunciation and contents; only structure (morphology and syntax and vocabulary selection) was evaluated along the criteria laid down in our chapter on evaluation of errors.

List No. 2A

~~APPENDIX II~~

Conversation Lessons I.
(Dialogues)

1. Am Bahnhof

Frau Schulz: Komm schon, der Zug fährt gleich ab. Wir müssen auf Bahnsteig 8.

Herr Schulz: Ja sofort, ich kaufe nur schnell die Karten.
(am Schalter): Zwei Karten erster Klasse nach Frankfurt und ein Kind.

Das Fräulein: Wünschen Sie Rückfahrkarten, mein Herr?

Herr Schulz: Nein einfache, bitte. Wann fährt der Zug ab?

Das Fräulein: Der Schnellzug nach Frankfurt fährt um 20 Uhr 45 ab.

2. Im Lebensmittelgeschäft

Die Verkäuferin: Guten Tag, gnädige Frau, womit kann ich dienen?

Frau Schulz: Ich habe heute eine lange Liste. Warten Sie mal...,ja, zwei Pfund Mehl und ein Dutzend Eier.

Die Verkäuferin: Wünschen Sie die grossen oder die kleinen Eier?

Frau Schulz: Geben Sie mir die grossen Eier, bitte.

Die Verkäuferin: Was darf es sonst noch sein?

Frau Schulz: Ein Pfund Salz und ein Pfund Zucker, zwei Flaschen Milch und ein Brot.

3. Im Restaurant

Herr Schulz: Herr Ober!

Ober: Bitte sehr, mein Herr.

Herr Schulz: Bitte bringen Sie mir eine Speisekarte.

Ober: Sofort bitte. Was wünschen Sie zu speisen? Vorspeisen, Suppe? Rindfleisch, Kalbfleisch, Schweinefleisch, oder gebratenes Huhn?

Frau Schulz: Ich möchte keine Suppe...

Herr Schulz: Gebratenes Huhn für meine Frau und Rinderbraten mit pommes frites.

APPENDIX [illegible]

List No. 2 B

Conversation Lessons II.
(Dialogues)

1. Im Kaufhaus

Kathrin: Der Hut passt gut zu deiner Jacke. Sieh mal, gefällt dir diese Halskette?

Liesl: Ja, sie ist sehr hübsch, aber diese gefällt mir besser, oder nein,... diese ist die beste.

Kathrin: Na, schön, da fällt mir ein,... Ohrringe brauche ich auch, und ein passendes Armband.

Verkäuferin: Bitte sehr gnädige Frau, wollen Sie diese probieren?

Kathrin: Ja, lassen Sie mal sehen. Du, Liesl, ich glaube, die sind zu lang!

Liesl: Nein, die können gar nicht zu lang sein.

2. Ein Besuch am Bauernhof

Herr Huber: Guten Tag, Herr Schulz, sind Sie schon lange in Rossbach?

Herr Schulz: Guten Tag, Herr Huber. Wir sind vor einer Woche angekommen. Wir bleiben noch zwei Wochen. Wir möchten gern Ihren Hof sehen, könnten Sie uns ein bisschen herumführen?

Herr Huber: Aber gerne. Gehen wir zuerst in den Stall; da sehen Sie ein kleines Kälbchen.

Herr Schulz: Wie alt ist es?

Herr Huber: Es ist erst eine halbe Stunde alt.

3. Auf der Strasse

Frau Schulz: Ist das unser Autobus?

Herr Schulz: Ja komm Liesl, wir steigen in diesen Autobus ein.

Frau Schulz: Geh schneller, Hermann, Vater wartet schon bei der Lampe.

Hermann: Mutti, darf ich das Auto dort drüben sehen?

Frau Schulz: Das kannst du ein andres Mal tun. Gleich haben wir grünes Licht und der Autobus fährt los.

Herr Schulz: Ihr müsst euch beeilen, wir haben nicht viel Zeit.

Frau Schulz: Also los, geh nicht so langsam Hermann!

List No. 2C

Test Questions to Conversation Lessons I

A. Contents Questions:

1) Q.: Was bringt der Ober?
A.: Der Ober bringt eine Speisekarte.

2) Q.: Was kauft die Frau?
A.: Die Frau kauft zwei Pfund Mehl und ein Dutzend Eier.

3) Q.: Was macht Herr Sculz am Bahnhof?
A.: Herr Schulz kauft die Karten.

B. Dialogue Responses:

4) Q.: Was wünschen Sie zu speisen?
A.: Ich möchte Rinderbraten mit pommes frites.

5) Q.: Wünschen Sie Rückfahrkarten?
A.: Nein, einfache bitte.

6) Q.: Womit kann ich dienen?
A.: Ich habe heute eine lange Liste.

C. Completion Exercises:

7) Q.: Der Schnellzug...
A.: ...nach Frankfurt fährt um 20 Uhr 45 ab.

8) Q.: Wir müssen...
A.: ...auf Bahnsteig Acht.

9) Q.: Was darf...
A.: ...es sonst noch sein?

10) Q.: Ein Pfund Salz...
A.: ...und ein Pfund Zucker.

11) Q.: Vorspeisen, Suppe?...
A.: ...Rindfleisch, Kalbfleisch, Schweinefleisch oder gebratenes Huhn?

12) Q.: Ich möchte...
A.: ...keine Suppe.

List No. 2D

Test Questions to Conversation Lessons II

A. Contents Questions:

1) Q.: Was tut Kathrin?
A.: Sie kauft Ohrringe und ein Armband.

2) Q.: Was möchte Herr Schulz tun?
A.: Er möchte den Hof sehen.

3) Q.: Wo wartet Vater?
A.: Er wartet unter der Lampe.

B. Dialogue Responses:

4) Q.: Sieh' mal, gefällt dir diese Halskette?
A.: Ja, sie ist sehr hübsch.

5) Q.: Sind Sie schon lange in Rossbach?
A.: Wir sind vor einer Woche angekommen.

6) Q.: Mutti, darf ich das Auto dort drüben sehen?
A.: Das kannst du ein anderes Mal tun.

C. Completion Exercises (answer represents first part of statement)

7) Q.: ...da sehen Sie ein kleines Kälbchen.
A.: Gehen wir zuerst in den Stall...

8) Q.: ...Es ist erst eine halbe Stunde alt.
A.: Wie alt ist es?

9) Q.: ...oder nein, diese ist die beste.
A.: Diese gefällt mir besser...

10) Q.: ...aber diese gefällt mir besser.
A.: Ja, sie ist sehr hübsch...

11) Q.: ...wir haben nicht viel Zeit.
A.: Ihr müsst euch beeilen...

12) Q.: ...und der Autobus fährt los.
A.: Gleich haben wir grünes Licht...

V. Results

1. Classification of Students into Preference Groups

Since the composite nature and degree of preference types in language learning is in itself very difficult to determine and to delimit, the investigators decided to analyze the demonstration of preference according to two basic criteria:

(a) Analysis of percentage scores of full retention in each of the four learning modes of Phase 1:

In this analysis the chisquare value for each student was computed in order to determine the clarity of the preference.Preference groups of students were thus established in the pictorial, combined and no-preference areas, and designated "statistic" groups. Since some students, according to the statistical results demonstrated a secondary strong preference in another learning mode, our analysis was also made to incorporate these students into the preference groups designated "statistic mixed". It is interesting to note that such combinations of preferences only occurred for pictorial and combined. (cf. Classification Chart 1b)

(b) Analysis of percentage scores of full and partial retention in each of the four learning modes of Phase 2:

This alternate analysis seemed valuable because it investigates a possible additional factor in language learning important to the linguist in order to delimit psychological factors from linguistic factors, since the degree of retention may be influenced by elements of linguistic transfer inherent in the contrastive analysis and the sound and structure relationship of the mother tongue and the target language. A consideration of high partial retention figures (as opposed to full retention) seems to be especially important for the concept of remedial learning and for programming learning materials as well as for the judgment of language aptitude within preference areas of sensory imagery. Groups so classified were designated "linguistic".

In classifying "linguistic" preferences as demonstrated in achievement scores of full retention and partial retention, the investigators proceeded similarly as in the classification of "statistic", "pure" and "mixed" groups. "Linguistic mixed" groups, therefore, incorporated students who demonstrated a secondary preference nearly as strong as the primary preference [1] (Cf. Classification Chart 2b).

2. General Evaluation of Results:

(a) Objective 1:

The first step in the evaluation (Phase 1: Word Learning) was to find out whether a student demonstrates a significant preference in modes of learning. This is determined statistically by the method of mean square deviation:

$$X^2 = \sum_{i=1}^{N} \frac{|M - S_i|^2}{M}$$

M = mean score pro student
S_1 = the student's percentage scores
N = number of such scores
[illegible] = mean square deviation

By comparing X^2 to the table of standard deviations we determine the probability of the observed results occurring by chance. We observe from Chisquare Analysis Chart I that seven out of eleven students tested have shown a clear preference for a specific learning mode since the statistical probability of their test scores varying accidentally to such degree is less than five percent. As a second step (Phase 2: Sentence learning) the same statistical analysis was made of the student scores in the three areas of pronunciation, structure and contents over the three learning modes. Here the results are not as striking, but nevertheless the statistics indicate that a preference for the learning modes is still significant, where in each of the three tested language areas (pronunciation, structure and contents) at least half of the students' scores vary such that the probability is less than five percent.

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[1] Therefore a student could be classified into only one (if any) "pure" group, but conceivably into more than one "mixed" group.

The third step in the evaluation was to determine whether there was a correlation for a given student between his preference demonstrated in the First Phase, i.e. word learning and the preference demonstrated in any or all aspects of the second Phase.

As a basis for the establishment of the correlation coefficients, the student's achievement in the tests of Phase 1 and Phase 2 was reduced to percentage scores (Cf. Chart: Individual Performance as Percentage of Total Possible Scores, p. 120). Between a student's performance in Phase 1 and Phase 2 in a given mode (pictorial, graphic, combined) the correlation coefficient (r) was computed by use of the method of Totals of Raw Scores:

$$r = \frac{N\Sigma XY - (\Sigma X \Sigma Y)}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$

where N designates the number of students and X the individual scores in the Phase 1 test in the given mode, and Y the individual scores in the Phase 2 tests in the given modes.

Statistically the results indicate a lack of correlation between the preferences demonstrated in word learning and preferences in the three areas of sentence learning in Phase 2. We observe that the highest degree of correlation for preferences in learning mode (although statistically not significant) occurs between word learning and learning of structure in the overall picture. In the Pictorial and Combined Learning Modes the highest coefficients can be found in comparing word learning and structure and in the combined mode in comparing word learning with content as well.

(b) Objective 2:

The objective in the evaluation of test results of Phases 1 and 2 (pretest and posttest) was to find out what degree of effectiveness the three teaching programs, applying different learning modes, would have on the four sensory image groups of learners. As the first step the investigator chose the analysis of covariance in order to study the effect of each learning mode on the different groups of preference learners. The results indicate that most subjects in all groups showed approximately the same achievement under the combined mode. This mode seems to be least discriminatory.

The effectiveness of the pictorial mode was significantly different in the various preference groups of learners highly favoring pictorial learning types. Significance was observed in the areas of structure and content.

Significance in structure learning could also be observed under the graphic mode for all preference groups. Visualization whether pictorial or grphic added to the audio stimulus (not replacing it !) seems to be beneficial (at least in German) for all preference learners.

The second step in the evaluation was to investigate the reaction of each preference group to the various learning modes on a comparative basis.[1] The results indicate the pictorial preference learners show a a definite correlation of achievement under the audio and the pictorial mode. The effectiveness of the pictorial learning mode on the combined preferehce types was inconclusive, but a trend favoring the pictorial mode could be observed.

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[1] Whereas the analysis of covariance attempted to discover how any given learning mode will influence students in general (belonging to different preference groups), the analysis of variance attempts to analyze the influence of a preferential learning mode on the students' demonstrated preference in sensory imagery.
~~sensory imagery~~

Since from our results we could not establish a group of purely graphic or audio preference learners, the results were inconclusive.

As the third step in the evaluation a cross analysis of audio results on different preference learners was made, i.e. that the achievement scores of all subjects under the audio learning mode were compared with those under the other modes in Phase 1 and 2. The results indicate no correlation between the audio mode and the pictorial or combined modes. These results, however, are not entirely conclusive.

The test results of Phase 1 indicate, however, that audio preference learners will not perform well under the graphic learning mode. The highest correlation coefficient between audio mode in Phase 1 and pictorial mode in Phase 2 was found in the area of structure.

A detailed discussion of the results of this investigation with the accompanying charts together with conclusions for testing and teaching procedures will follow under VI. Discussion.

Chart Ia

Classification of Sensory Image Types (Preferences)

STUDENT	PHASE 1	PHASE 2	GEN
1	C (+P)	G (+C)	C
2	C (+G + A + P)	P (+C)	C
3	P (+G + A)	C	
4	P (+C + A)	P (+G + C)	P
5	P (+A + C + G)	P (+C)	P
6	C (+ P)	G (+P)	(P)
7	P (+ C + G)	G (+C)	G
8	G (+ P + C)	G (+ P)	G
9	C (+ P)	C (+ P)	C (+P)
10	C (+ P)	C (+ G)	C
11	C (+ P)	G (+ C)	C

Chart I b

Classification of Students into Preference Groups

DESIGNATION OF GROUP		MODE	STUDENT No.
1a	STATISTIC PURE	Pictorial	3, 4, 7
		Combined	7, 6, 9
		No Preference	2, 5, 8
1b	STATISTIC MIXED	Pictorial	3, 4, 7, 10, 11
		Combined	1, 6, 9, 1o, 11
		No Preference	2, 5, 8
2a	LINGUISTIC PURE	Pictorial	3, 4, 7, 9, 10
		Combined	1, 11
		No Preference	2, 5, 6, 8
2b	LINGUISTIC MIXED	Pictorial	1, 3, 4, 7, 9, 10, 11
		Graphic	7
		Combined	1, 6, 10, 11
		No Preference	2, 5, 6, 8

Group I

3. Individual Evaluation of Tests I - IV (Phase 1)

Student No. 1

General Analysis:

The number of non-retained words on the four tests shows that the student attained the best results in the verbal-image test (III) and in the combined test while non-retention in the audio and the pictorial tests was considerably higher. The fact that test III contained the smallest number of non-retained words and at the same time the largest number of fully retained words (while the number of faultily reproduced words corresponded to those of the audio and the combined test) leads to the assumption that the student could be classified as a preferential verbal-image learner.

Student No. 2

The student clearly showed the best results in the combined test (IV) with the highest number of retained words and the lowest number of non-retained words. Both the audio and the verbal image test presented the greatest difficulty for the student as seen in the overall picture, while he showed better results in the pictorial image test which together with the results shown in the last (combined) test indicates rather clearly that this student can be classified as a preferential object-image learner. The fact that the student also had most mistakes in the test with the best results was balanced through the fact that he also achieved the highest number of correctly reproduced words in the same test.

Student No. 3

As the number of non-retained words shows, this student had considerable more difficulties in the first test than in the other three. It should be noted that in this test he either reproduced the words correctly or did not retain them at all, no incorrect reproductions were given. Among the other three tests the one with the graphic demonstrations shows the highest number of retention and the lowest number of non-retained words. The number of mistakes in this test was the lowest as compared with tests No. 2 and No. 4. The highest number of mistakes was found in test No. 4 (combined). It may be assumed that this student who did best in the graphic test was disturbed through the combination of multi-sensory stimuli as indicated in the equally high frequency of incorrect answers compared with correct answers.

Student No. 4

It is striking that this student in the selection of sample words showed exactly the same results in the first three tests with respect to the number of retained, non-retained and incorrectly reproduced words. In the last test he was considerably more successful than in the three others. In each of these the number of non-retained words was twice as large as in the combined test, while in the latter the number of retained words was twice as large as in each of the first three tests. The last test though contains also the highest number of incorrectly reproduced words but the fact that the number of non-retained words in the first three tests was extremely high compared with the results achieved by other students seems to indicate that this student faces extraordinary general difficulties in the learning of a foreign language. So the result in test No. 4 indicates that he relies to a large extent on a combined demonstration of multi-sensory stimuli.

Student No. 5

This student shows the best results in test No. 4 (with only three non-retained words but twelve retained words) and the poorest results in test No. 1 (with 15 non-retained words and five retained). In general it can be assumed that the visual demonstration facilitated learning and the retention while the audio-type produced considerable obstacles. Not only was the number of non-retained words much higher in the audio test than in the others but the number of incorrectly reproduced words was the lowest in comparison to the other tests. The total number of fully and partially retained sample words ranked in the following order: 19 (test No. 4), 16 (No. 2), 13 (No. 3), and 7 (No. 1). This result seems to indicate that the pictorial presentation did facilitate the retention of words in general but did not help much in retaining the words correctly as the high number of mistakes in this test shows. The ratio of retained words to incorrectly reproduced words was much higher in test No. 3 than in test No. 4. The graphic demonstration therefore caused superior respondent behavior than the combined stimuli of test No. 4 from good result of which alone a reliable analysis as to which factors caused this result could not be drawn. The fact that the number of retained words in test No. 4 was considerably higher than that of test No. 3 indicates that this student was not hampered by the combined form of presentation.

Student No. 6

This student shows gradual improvement from the first test to the last as can be seen in the increasing number of retained and decreasing number of non-retained words. The number of incorrectly reproduced words however varies inconsistently. A general analysis of test results therefore is inconclusive and this student may represent a type of learner who through his learning experience as such can progress independently of any predominant sensory-image type of learning personality.

Student No. 7

In analysing the student's progress from the audio test to the two visual tests we can say that the total number of retained words (fully and partially) increased in the two visual tests. When comparing the two visual tests it seems that the graphic demonstration facilitated the correct retention of sample words more than the pictorial demonstration. This can be seen from the fact that in test No. 3 the number of retained words was higher than in test No. 2 while at the same time the number of incorrectly reproduced words decreased. In the mixed demonstration the superior result may have been caused by the preference for visual type demonstration.

Group II

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 1

Results of Tests I - IV

The results of the tests show that the student tends more to the visual type of learner than to the audio-type. In all tests containing the visual element he was more successful than in the audio-type test. The number of retained words increased gradually while the development of the number of non-retained words does not show the same consistency. Although in the graphic test the number of retained words is relatively high, the number of non-retained words in the same test is much higher than in the other two types of vidual (audio-visual) presentations. Excluding the combined test, in an evaluation of the combined numbers of fuly and partially retained words the best result can be observed in the pictorial test. When analyzing the results from a different angle it can be seen that the student improved his retention capacity in the second test as compared to the first but fell back in the third test which like the second one was also visual but used only graphic symbolization. This leads to the conclusion that the student is more at ease when exposed to pictorial rather than to graphic presentation and faces considerable difficulties in the audio-type learning situation. The combined test resulted in an increase of incorrectly reproduced words but more positive influence on the full retention.

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 2

Results of Tests I - IV

This student achieved by far the best results in the audio test where the number of non-retained words equals that of retained words (no word was reproduced incorrectly.) The pictorial demonstration helped him to reduce the number of non-retained words to a large extent but at the same time produced an extremely high number of incorrect-reproductions. The graphic test showed the greatest number of non-retention scores. In fact in this test the ratio of non-retained words to faulty reproductions was reversed in comparison to the pictorial test. Therefore obviously of the two given visual presentations the pictorial type was more helpful to the student than the graphic type. In the combined test the scores of retention, non-retention and incorrect reproduction were fairly well balanced so that it is difficult to draw valid conclusions from this result. It has to be noted though, although the student achieved a higher total number of full and partial retention scores combined, he could not attain the high percentage of retention obtained in the audio test (his apparent preference type).

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 3

Results of Tests I - IV

The student showed regular improvement in the number of incorrectly reproduced words from the first to the last test, while at the same time the number of non-retained words increased. The retention scores varied, being the lowest in the audio test and the highest in the pictorial test. In the combined test the retention score was very low again. The student was most successful in the pictorial and in the graphic test, which seems to indicate that she shows a preference for visual presentation. The pictorial presentation seems to have helped the student most in concept forming for reproduction. The graphic demonstration also facilitated her learning although not to the same extent while the combined presentation of all three media as it seems confused the student or at least hampered her retention so that even the number of incorrectly reproduced words was extremely low in addition to the low number of fully retained words.

Visual-graphic presentation however seems to lie outside the student's visual retention capacity. From this it may be concluded that the good result of the combined test was mainly caused by the combination of audio and pictorial stimuli, while the graphic element in this test was of minor importance.

Individual Evaluation - Phase 1

(Retention of Vacabulary)

Student No. 4

Results of Tests I - IV

The retention scores of this student show that she was able to gove a high number of correct responses in the first two and in the last test while the result of the graphic test, as compared with the others, was extremely poor. Graphic demonstration resulted in high non-retention (15 out of 22 items) and no partial retention. The result seems to reveal that the student had to rely on her recollection of the graphic image of the word in order to memorize it and since she had to overcome great difficulties in this respect the number of correctly retained words was very low. In the pictorial test the number of fully retained words was very high whereas only two out of twenty-two sample words were reproduced incorrectly. The pictorial image therefore seems to facilitate her memorization in such a way that the correct sounds of the word are associated with the object shown in the picture. The results of the audio test show that the purely acoustical stimuli already facilitate storing and retention of information material. When comparing the audio test with the pictorial test we can however see that the visual-pictorial presentation meets the student's greatest capacity (or combinatory efficiency).

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 5

Results of Test I - IV

The student shows almost the same preference scale in the different modes of presentation. He was most successful in test No. 2 and No. 4 (pictorial and combined test) and showed rather good results in test No. 1 while in the graphic test the number of fully retained words was rather low and the number of faulty reproductions was the highest in this test as compared to the others. The number of non-retained words was roughly the same in all four tests. The student seems to be preferably pictorial-object oriented. The combined presentation resulted in the same scores as the pictorial and it can be assumed that the relatively high capacity shown in the audio and pictorial tests was also prevalent in the results of the combined test. This seems to indicate that the capacity described was strong enough to suppress the negative influence of the graphic element in the combined stimulation.

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 6

Results of Tests I - IV

A conclusive analysis of the results demonstrated is extremely difficult. Whereas the full retention scores were equal in the pictorial graphic and combined tests the non-retention scores vary significantly and so do the scores of partial retention. The number of non-retained words and the number of incorrectly reproduced wordes were inversely correlated. Thus in the pictorial test, seven out of twenty-two sample words were not retained but five words were reproduced with mistakes, while in the graphic test the ratio was 11 (not retained words) to 1 with mistakes. One could tentatively assume that this student tends more towards the type of pictorial-image learner than to the graphic type. The results of the combined test are not conclusive enough to strengthen this view satisfactorily. The fact that in the combined test the number of incorrectly reproduced words was so high, can be interpreted in different ways. The student might have been irritated by the simultaneous presentation of audio and pictorial plus graphic stimuli since he had shown considerable weakness in avoiding mistakes already in the audio and pictorial test so that a minimum capacity to overcome irrating influences was not reached. On the other hand we know from experience that testing conditions cause a certain amount of non-reaction out of cautiousness. This may, as in this case, be reduced or increased depending on the existence of preferential type of stimuli. Thus the high number of mistakes in the pictorial test and the low number in the graphic test (which seemingly was less preferable to the capability of this particular student than the pictorial one) could be explained.

Individual Evaluation - Phase 1

(Retention of Vocablary)

Student No. 7

Results of Tests I - IV

This student shows a clear preference for the visual type demonstration. In the pictorial and the graphic test, the highest number of fully retained words could be achieved. The result of the pictorial test was excellent because only three words were not retained and no words were reproduced incorrectly. In contrast, in the audio test only five words out of twenty-two were fully retained but thirteen were not retained and four words were reproduced incorrectly. It is interesting to note that the result in the combined test was almost equally poor and it can be assumed that the complexity of the multi-sensory stimulation confused the student and caused the poor result. If we compare the results of this student with those of student No. 5 (Group II) we might hypothesize that a high result in the combined test can only be achieved when an optimal preference in the pictorial-image type is sufficiently supported by a considerable strength in the audio S-R function (the amount of which has to be found yet).

Individual Evaluation - Phase 1

(Retention for Vocabulary)

Student No. 8

Results of Tests I - IV

No clear preference for a particular type of presentation can be established on the basis of test results. Among the retention and non-retention scores only slight variations could be observed. With regard to retention, though, better results were achieved in the visual and combined tests. The low number of fully retained words in the audio test contrasted with a high number of faulty reproductions while the number of faulty reproductions in the other tests was very low (being lowest in the graphic test). It may be concluded that the absence of any visual complement in the stimulation in the first test has caused the student a considerable amount of anxiety resulting in many incorrect reproductions. Tentatively it can be said that the student shows a tendency towards visual stimulation preference which may have been prevalent also in the student's response in the combined test.

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 9

This student shows the best results in the pictorial test and in comparison to the other tests, relatively good results in the audio test. In the graphic test, on the other hand, an extremely high degree of non-retention could be observed. This may lead to the conclusion that his visual preference is exclusively pictorial image oriented and strongly supported by an audion S-R function but not at all by a strength in memorizing verbal images. When analyzing the results of the combined test one again could assume that the presence of the graphic symbolization reduced his retention capacity as can be seen in the extremely high number of incorrect reproductions in the combined test. The student's preference for pictorial and audio modes of instruction encouraged reproduction even if he was not absolutely firm in his memorization of sound patterns so that the score of partially retained words was considerably higher than in the graphic test.

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 10

Results of Tests I - IV

In comparing the test results of this student a clear contrast can be observed between the pictorial and the combined test scores on the one hand and the graphic and audio scores on the other hand. In the pictorial test he retained 15 out of 22 words as opposed to only four non-retained words; this result was reflected in the ratio of 13 retained to 3 non-retained words in the combined test. The audio test however resulted in only 5 retained words versus 15 non-retained words and a low number of faulty reproductions (only two words). In the graphic test five out of twenty words were partially retained while the number of non-retained words was lower than in the audio test, whereas the retention score in the graphic test showed only two more points than that of the audio test. In spite of the fact that in the combined test the student was almost as successful in retention as in the pictorial test he yet produced twice as many faulty reproductions under combined conditions.

Individual Evaluation - Phase 1

(Retention of Vocabulary)

Student No. 11

Results of Tests I - IV

The best results achieved by this student canbe found in the conbined test with a score of 19 fully retained words and only one incorrect reproduction. This good result can be associated with the high retention (17) and low non-retention score (4) in the pictorial test which again showed only one incorrect reproduction. The student definitely was not audio-oriented as can be concluded from the high number of non-retained words in the audio test. But he also cannot be classified as a graphic image type since the non-retention score in the graphic test was still very high as compared to that in the pictorial test. In general, the additional observation is worth mentioning that the student seems to be very cautious and restrained in his reproduction behavior when he is absolutely convinced of the correctness of his memorization. This notion is indicated by the unusually low number of partially retained words to be found in all four tests (never higher than 2).

The second phase included two series of conversation lessons, each composed of three units which were learned through different modes of instruction:

1. Auditory and pictorial presentation of the utterances (Pictorial-Type);

2. Auditory and graphic presentation of the foreign phrases (Verbal Image-Type);

3. Auditory and graphic presentation of the foreign utterances combined with presentation of pictorial symbols for each syntactical unit (questions, answer s, statements and mands) (Audio-Pictorail-Verbal Image-Type, or Combined).

A purely auditory presentation of the foreign utterances and their English equivalents was not included in the teaching modes applied in the second phase because only one subject out of eighteen showed a clear preference for the auditory presentation in the first phase of the experiment. Furthermore, the percentage of the total number of subject poplation achieving full or partial retention of more than 50% of subject matter in the Audio-Type presentation was zero, or in other words, half of the subjects were not able to achieve more than 25% of subject matter retention, while the other half of the subjects were not able to exceed the 50% level of subject matter retention. In evaluation of the partial retention scores, we can see that, while 83% of all students could partially retain 25% of the subject matter, only 17% of the student population were able to reach the 50% level, and none of the students were able to go beyond that mark.

This result led the investigator to the asumption that the retention of syntactical units achieved through auditory presentation would show even poorer results which would be less valuable in terms of comparative analysis than the retention of words. On the basis of this assumption and in consideration of the unfeasibility of a learning procedure which would in all its stages exclusively be based on this one type of presentation, it was decided to omit this type of test in the second phase of the experiment.

Individual Evaluation - Phase 2

Student No. 1

Test I

Retention scores in test I show that the student demonstrated a preference for the combination type of learning in pronunciation and for the graphic type in structural retention. In both pronunciation and structure the retention scores were lowest in the pictorial type of learning mode. The results of content retention show no difference in the graphic and combined learning situations but are considerably lower in the pictorial mode.

Test II

In the second test the highest retention scores in pronunciation were achieved through the graphic demonstration while there was no significant difference of retention in the pictorial and combined situations in retention of structure. Structural retention was highest in the graphic situation and the pictorial mode (no significant difference). Performance in pronunciation, structure and content ranked in the same order: Graphic, Pictorial, Combined. Content retention was highest under the graphic learning mode and lowest in the combined situation.

General Conclusions

1. Pronunciation

The results of Test I show a significant preference for the combined method of presentation, with a strong trend towards the graphic image type, while in Test II the retention was optimal under the graphic demonstration and followed by the pictorial but significantly lowere under combined. The student shows a combination type of combined and graphic image preference.

2. Structure

   In both tests the highest retention scores were achieved under verbal image type stimulation while a trend could be perceived under combined presentation of stimuli.

3. Content

   Retention of contents showed optimal scores in the graphic presentation of both tests while there was a trend towards combined in Test I and towards pictorial in Test II.

The results of phase 1 and 2 compared show that in learning vocabulary the student's memorization is obviously assisted by pictorial stimuli while the learning of the sound patterns of structural units is facilitated by the graphic element and to a lesser degree by the combined and pictorial presentation of stimuli.

Individual Evaluation - Phase 2

Student No. 1

Test I and II

Retention scores in Test I did not show any significant difference in either pronunciation, structure or content. As far as a reflection of differentiation in preference can be deduced at all from the retention scores under combined presentation in Test II, a slight trend towards pictorial and graphical can be assumed.

General Conclusions

It has to be noted that this student is an extremely gifted learner, and her achievement in retaining vocabulary rates second best in the first phase of the experiment. The total of the student's retention scores in learning syntactical units also reveals unusual aptitude and achievement. While it seems that in unusually gifted students the retention of vocabulary depends to a considerable extent on the presentation of preferential stimuli (in this case the pictorial), this need not be the case in retaining syntactical units.*

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*In the interview the student expressed a slight disfavor of the combined presentation of learning material. On the basis of this it may be assumed that in programming learning materials of longer sequences, a preferential learning mode my have to be considered.

Individual Evaluation - Phase 2

Student No. 2

Test I

While the pronunciation scores show optimal retention under the graphic demonstration, the scores in pictorial and combined showed no significant difference. In structural retention the student demonstrated clear preference for the graphic mode with a trend towards the pictorial. Contents were best retained under the graphic image presentation while retention under the other two modes was equal.

Test II

Mastery of both pronunciation and structure was optimal under the pictorial presentation and minimal under the graphic presentation. A trend towards combined stimulation could be observed. Content was best retained under the pictorial stimulation, also with a tendency towards combined learning mode.

General Conclusions

1. Pronunciation

   In each of the two tests the retention scores under pictorial and combined stimulation showed significant similarity of preference. Optimal retention was achieved under graphic stimulation in Test I, and under pictorial stimulation (followed by combined stimulation) in Test II.

2. Structure

Preference in structural retention shows a direct relationship to retention in pronunciation, while the only exception that in Test I a higher retention was achieved under the pictorial learning mode than under combined stimulation.

3. Content

Retention in content reflects the fluctuation of results in the retaining of sound pattern and structural form.

The evaluation of the results in Test 1 and 2 does not enable us to establish conclusively a predominant preference type. It can be assumed that this difficulty is caused by the clear preference for pure audio-type stimulation shown by the student in phase 1 which was not applied as a learning mode in phase 2. Comparison of results in phase 1 and 2 shows, however, a strong trend towards the pictorial image type of learning.

Individual Evaluation - Phase 2

Student No. 3

Test I and II

Retention scores in pronunciation, structure and content show a significant preference for the combined presentation of stimuli. The demonstrated trend towards graphic image learning in the first test and the one towards pictorial learning in the second test bear no significance.

General Conclusions

This student, whose retention scores in the first phase (learning of vocabulary) did not exceed the 40 Per cent level either in full or in partial retention, also achieved poor results in learning structural units. While the pictorial stimulation facilitated optimal performance in the learning of vocabulary, the combined stimulation effected optimal learning of sentences (not exceeding the 50% level). The student's pictorial preference and trend towards graphic presentation demonstrated in vocabulary learning indicate her need for combined stimulation in learning more difficult structural forms and thus was the cause of optimal retention in the results demonstrated in phase 2.

Individual Evaluation - Phase 2

Student No. 6

Test I

Both in pronunciation and in structure this student demonstrated optimal preformance under graphic presentation of stimuli while in the pictorial-type and combined learning mode he was successful, with no significant difference in the results. The same applies to the retention of content.

Test II

In this test optimal retention of pronunciation and structure was achieved under pictorial and graphic stimulation, the retention scores being lower in the combined method.

General Conclusions

The student shows a clear preference for the verbal image type with a strong trend towards the pictorial. The student, whose full retention scores in vocabulary learning did not differ in the pictorial, graphic and combined modes, was categorized as a combined preference type (with a strong trend towards the pictorial) on the basis of high partial retention scores in these learning modes. In learning syntactical units, the student apparently needs the graphic image but is also strongly assisted through pictorial demonstration, especially in learning of sound patterns.

Individual Evaluation - Phase 2

Student No. 7

Test I

The student's retention scores in pronunciation, structure, and content did not show any significant difference between the graphic and the combined learning mode. The pictorial retention scores did not exceed the 25% level.

Test II

In this test the student again showed high performance under verbal image stimulation (above the 98% level of retention) in all three language areas. Contrary to the first test, his retention was lower this time in the combination type but optimal in pronunciation and second best in structure in the pictorial image type. It is interesting to note that the student's optimal retention in learning sound patterns was facilitated through the pictorial mode while optimal retention of structural form could only be retained under the graphic stimulation.

General Conclusions

In comparing the result of vocabulary learning with those obtained in learning structural sequences, the student's trend towards the graphic type expressed in the first phase became dominant when he had to retain phrases rather than words. In learning phrases, however, the pictorial element facilitated his retention considerably more in the pronunciation area than in the structural forms.

Individual Evaluation - Phase 2

Student No. 8

Test I

Optimal performance in pronunciation, structure and content was achieved by this student under pictorial stimulation. Retention scores achieved under combined stimulation ranked next, while retention achieved under graphic stimulation did not exceed the 50% level in any of the three areas.

Test II

Highest performance in all three language areas was achieved under the graphic stimulation while the pictorial and combined presentation of stimuli did not result in retention scores higher than 25 per cent in any of the three areas.

General Conclusions

In analyzing the retention scores of Test I and II, in spite of their not being entirely conclusive, the student may be categorized as a visual type with a slight preference of the graphic element and a strong trend towards the pictorial. In comparing the results of structural learning with those of vocabulary learning, it is important to note that the student's partial retention scores in vocabulary learning were the lowest under the graphic stimulation and not much higher under pictorial stimulation, but highest under combined stimulation.

Individual Evaluation - Phase 2

Student No. 9

Test I

This student's retention did not exceed the 25% level in any of the three areas under pictorial stimulation but showed optimal performance under the combined learning mode (pronunciation 93%, structure 84%, content 100%). Retention scores in the graphic mode did not exceed the 50% level in any of the three language areas.

Test II

While the graphic retention scores in pronunciation and structure showed the same low results as in Test I, all three retention scores under pictorial stimulation were very high (contrary to Test I). The student's performance under combined stimulation, however, did not significantly differ from that under the graphic stimulation but was considerably lower than in Test I (scores representing only 50% of the score valuse of Test I).

General Conclusions

The student can be categorized as a combined preference type with a strong trend towards pictorialstimulation. The student's total achievement in bocabulary learning did not exceed the 45% level in full retention of words in any of the four modes of stimulation. In learning structural forms the student's performance was also relatively poor. His trend towards the pictorial image type demonstrated in the vocabulary learning phase could again be observed in the learning of structural units. The student seemed to have demonstrated a pictorial and audio combination learning type in the vocabulary tests (having only little aptitude for the learning of languages). His dependency on the audio element reappeared in the learning of phrases and may account for his preference for the combined instructional method.*

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*In programming sequences of learning units, a strong reinforcement of the audio element may have to be considered for this student.

Individual Evaluation - Phase 2

Student No. 10

Test I

The student showed high results in pronunciation and structure in the verbal image and the combined types while his retention was very low under the pictorial condition. In the graphic mode he was a little less successful in structural retention than in retaining sound patterns. In Test II in both pronunciation and structure as well as in content retention the student's performance was optimal under combined stimulation. He also achieved high results in the graphic mode, being slightly less successful in structural retention under pictorial stimulation.

General Conclusions

In the overall picture the student demonstrated a preference for the combined learning mode. Performance under graphic was nearly equally good while the pictorial mode resulted in significantly low performance. In comparing the student's performance in learning vocabulary and in learning structural forms, his strong tendency towards the combined mode can be recognized as being equally important. While the student demonstrated a great dependency on the pictorial stimulation in the learning of vocabulary and his retention was nearly as much assisted by the combined stimulation (the audio-type presentation effecting only very low results), the combined and the graphic both seemed most needed for optimal performance in learning structures.

Individual Evaluation - Phase 2

Student No. 11

Test I

In pronunciation, structure and content the student demonstrated a preference for the combined learning mode with a strong trend towards the graphic. His performance under the pictorial mode was less successful but still relatively high.

Test II

In all three language areas preference was demonstrated for the pictorial learning mode with a very strong trend towards the graphic stimulation. While the combined mode still favored retention of pronunciation to some extent, it resulted in a lower score in retention of structure.

General Conclusions

The overall picture shows optimal performance in all areas in the graphic learning mode with nearly equal results in pictorial and combined situations. While the preference for the combined learning mode, demonstrated in retention of vocabulary, reappeared only as a tendency in the scores of pronunciation retention and of structural learning, this tendency is less significant for the retention of structural form. The dependency on graphic symbolization was clearly expressed as a dominant factor in learning structural units.

VI. DISCUSSION

In conclusion we can sum up the findings of this investigation in answering three essential questions dealing with some of the complex features of sensory imagery and retention in foreign language learning thus:

First Question: ARE THERE PREFERENCES FOR LEARNING MODES IN THE ACQUISITION OF THE SKILL OF AUDIO COMPREHENSION AND ORAL REPRODUCTION ? (Cf. Table on Chisquare analysis Phase 1 and 2)

Although the investigators are aware of the limited validity of results obtained in the present study, one can regard it as a pilot investigation which, as the first of its kind, did give valuable clues significantly indicating the definite existence of preferences in sensory imagery and learning modes adjusted to these. Large-scale field studies which can be designed along the lines of this pilot study should enable us to reconfirm and revalidate the existence and consideration of these preferences in foreign language learning. This consideration seems to be highly important for a new orientation in remedial learning of the average and low achievement groups. Incorporation of sequential steps in programming elementary teaching of phonemic, morphological and syntactical features in the different learning modes should utilize preferential aids of a visual (pictorial) as well as graphic phonetic symbolization whenever possible. The combined approach seems only advisable when auditory retention capacity and preference is higher than average. A conclusive analysis of the distribution and frequency of the various types and combination forms of preference learners is hard to obtain even after large field studies with thousands of subjects will have been conducted. Such results may also vary in different cultures as a results of the impact of the modern mass media incorporated in the communication processes of everyday life as well as the educational experience of the school system and its curriculum. As a gross generalization, it can be assumed that the trend towards visualization and consequent phenomenal abstraction does not establish a favorable milieu for audio preference development. The art of listening and orally expressing the comprehended matter must be increasingly more trained through auditory stimuli of various degrees. Language aptitude tests in this respect will have to be modified in this light in establishing a clear distinction between real linguistic aptitude and mere deficiencies in auditory aptitude.

At the same time the preference stimuli favored by the milieu of our visual age must be utilized not only for high audio achievers (who seem to be scarce per se) but especially for the highly frequent visual and visual-combination types in utilizing their strengths for increase of motivation in achieving the auditory learning goal. In practice, this will mean that the organized and systematized application of visual aids will have to be incorporated into the language laboratory on a highly flexible scale.(*) A further valuable aid in this respect will be the extensive application of highly motivating audio-visual teaching media such as the animated cartoon teaching film.

This can be used in the form of 8 mm cartridge films which recombine and summarize segmental steps previously taught through pictorial stimuli in the form of stills. This application should be of value not only for visualization of speech patterns with respect to their content matter, but also in consideration of the so far much neglected intonation patterns. Theoretical research findings,

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(*)Visual aids for the learning process in mastery of lexical items should preferably only consist of pictorial images and in priciple not of graphic symbolization. This is a suggestion which the investigation revealed. In the transition to structural patterns, these pictorial aids should be gradually extended into effective cues for action processes or descriptive analysis of everyday situations. The still picture offers great help in build-up drills as well as in creative drillsof the substitution, transformation, and recombination type. Thus audio repetition and creative drills can be complemented by sets of pictures which stimulate the visual minded student to direct association of the pictorial cue with the expected auditory response desired as a terminal behavior pattern.

such as those recently presented by Pierre DeLattre. (90a-c) Indicate this visual aid In this way we could, for instance, demonstrate the rising intonation patterns of the sensegroups of a German, French, or Spanish statement as contrasted to the falling intonation patterns of English in the equivalent situation. Also the important features of final or prefinal sentence intonation of the verbal elements in the tension field of the German sentence (viz., the discontinuous verb sequence and the stressed directives as pivotal elements of the sentence) as contrasted to the very frequent stress patterns preferably assigned to the nominal elements in the English and French sentence. This visualization would be important in all stages of language training, from the elementary through teacher or interpreter training. The highly important mastery of open and closed juncture (onset and offset and glottal stop), can be treated in addition to tone and stress features. Animation has excellent possibilities in visualizing pause and the plosive of the glottal stop. Extensive drills for recognition and practice of word groups (sense groups) as partials of the entire tension field of a syntactical pattern can be visualized in these pattern drills. The different stages of training in linguistics, as well as teaching programs in foreign languages, should utilize this possibility. An introductory course in phonemics and syntax should offer ample opportunity to apply visualization. Important steps in transformation grammar could be elucidated by this procedure. The artist and cinerist in co-operation with the linguist and language teacher should apply pictorialization, speed, and vanishing techniques, and various optical and motion techniques of the camera, to bring out the desired effects in the visualization of supra-segmental features of speech production. Phonetic and Phonemic distinctions in sound production (articulation basis, tongue and lip movement, etc.) can also be visualized in mere sound training. As a practical example, one might practice the lip rounding in German or French modified vowels ([ü], [oe], [ø]) in word and sentences drills which are supplemented by overhead projection of mouth positions with the use of polarization to create an effect of animation on the projected transparencies.

CHISQUARE ANALYSIS

PHASE 1 : WORD LEARNING

STUDENT	CHISQUARE	PROBABILITY	SIGNIFICANCE
1	16.198	0.01	*
2	3.713	0.50	none
3	13.739	0.01	*
4	38.860	0.01	*
5	1.090	0.90	none
6	7.159	0.20	*
7	25.924	0.01	*
8	4.355	0.50	none
9	17.518	0.01	*
10	29.375	0101	*
11	27.886	0.01	*

PHASE 2 : PRONUNCIATION

STUDENT	CHISQUARE	PROBABILITY	SIGNIFICANCE
1	7.984	0.05	*
2	2.299	0.70	none
3	46.972	0.01	*
4	0.563	0.95	none
5	6.338	0.10	*
6	1.506	0.70	none
7	4.577	0.30	none
8	5.246	0.20	*
9	7.231	0.10	*
10	5.586	0.20	*
11	2.766	0.50	none

PHASE 2 : STRUCTURE

STUDENT	CHISQUARE	PROBABILITY	SIGNIFICANCE
1	6.348	0.10	*
2	2.424	0.50	none
3	46.856	0.01	*
4	1.045	0.80	none
5	11.162	0.02	*
6	2.514	0.50	none
7	8.338	0.05	*
88	5.030	0.20	*
9	5.828	0.20	*
10	6.700	0.10	*
11	1.292	0.80	none

PHASE 2 CONTENT

STUDENT	CHISQUARE	PROBABILITY	SIGNIFICANCE
1	5.882	0.20	*
2	1.562	0.70	none
3	37.500	0.01	*
4	1.086	0.80	none
5	4.545	0.30	none
6	3.571	0.50	none
77	8.750	0.05	*
8	4.999	0.20	*
9	4.999	0.20	*
10	10.714	0.02	*
11	1.086	0.80	none

Second Question:

IS THERE A CORRELATION BETWEEN PREFERENCE DEMONSTRATED IN WORD LEARNING AND PREFERENCES DEMONSTRATED IN THE FOLLOWING SUBAREAS OF SENTENCE LEARNING : PRONUNCIATION, STRUCTURE, CONTENT?

The results of the investigation clearly demonstrate that there is no correlation between word learning and any of the learning skills in sentence learning under the graphic mode. The highest correlation can be seen between word learning and content retention under the combined mode. Learning of structural patterns shows some correlation to word learning under the combined and pictorial mode. The correlation coefficient for word learning and pronunciation is highest under the combined mode and non-existent under the graphic. This correlation between word-learning and pronunciation in sentence learning appears in general to be the lowest of all learning areas. These results seem to indicate, to some extent at least, that complementary pictorial stimuli aid retention and consequently facilitate oral reproduction of conceptualized structural patterns. If we analyze the correlation between word learning and the subareas of sentence learning: pronunciation, structure, and context, we can find a significant trend only in the areas of content and structure under the combined mode. Further investigation will be required to determine with any degree of certainty the actual correlation between word- and sentence-learning in these areas. Since this investigation was aimed at correlations within preference groups, this was not part of the objective of the experiment.

It seems to be permissible to assume that the nearly 50 % correlation of achievement in word learning and in learning of contents matter in sentence patterns confirms a well established fact of audio visual research, that in general maximal use of multisensory stimuli may bring optimal result in retention of contextual facts. A confirmation of this well-known axiom of audiovisual teaching may be interesting, however there are two important additional factors also indicated in the results of our study which immediately limit the value of this pedagogical tenet for the specialized discipline of language learning:

1. Retention of content matter is only one of several skills and becomes important only if it is associated and combined with the facility of expression of correct sound intonation and structure patterns. *)

Therefore the above axion, regarding a cumulative value of multisensory stimuli, may need a careful redefinition for language learning, where the associative skill of analogy and the imitative behavioral skills are certainly more important than the mere retentive skills of factual learning in other disciplines. In conclusion then we may assume that adding stimuli in language learning may only predict added performance in 50 % of the cases.

2. The comparatively limited correlation in any of the learning skills including retention of content matter seems to confirm again the existence of preference types which have to be considered in aptitude testing as well as in remedial learning in order to find any significant degree of correlation of word and sentence learning. It may be assumed that in 60 % of the cases preferences demonstrated in the learning process rather than simple addition of sensory stimuli are responsible for optimal achievement. These preferences, however, are not only dependent on a concentration in their sensory modes but also on the degree of segmentation and organization of programming steps within those modes and within the audio mode desired in the response act of the terminal behavior.

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*) This fact is closely related to frequently occurring misconceptions about the value of pictorial tests which apply a multiple choice answer system for the interpretation of contents matter of pictorial stimuli. What is frequently examined in these tests is only the retention of contents associated with "intelligent guessing" but not the retention of content matter combined with the skill of active expression.

CORRELATION CHART I

COEFFICIENTS OF CORRELATION BETWEEN WORD LEARNING AND SENTENCE LEARNING IN PHASE 2

PICTORIAL MODE		
WORD LEARNING - PRONUNCIATION	0.20856	
WORD LEARNING - STRUCTURE	0.34456	
WORD LEARNING - CONTENT	0.23788	
GRAPHIC MODE		
WORD LEARNING-PRONUNCIATION	0.54401	
WORD LEARNING - STRUCTURE	0.02831	
WORD LEARNING - CONTENT	0.01856	
COMBINED MODE		
WORD LEARNING - PRONUNCIATION	0.32479	
WORD LEARNING - STRUCTURE	0.40573	
WORD LEARNING - CONTENT	0.49558	

Subanalysis of Audio Performance (Phase 1) and Graphic Performance (Phase 2)

The correlation coefficient of the botton group between audio mode in Phase 1 & Phase 2 in the learning area of content appears as zero. This result is caused by the fact that all students in this group achieved the same score in this learning discipline and mode. A correlation coefficient therefore could not be computed, because p would be the quotient of a zero-divisor. If we compare the coefficients of the three achievement groups in the same lerning area and mode, it is interesting to note that the high achievers aswell as the underachievers show no predictability while the middle group (average achievers) shows a distinct negative prediction (-.[illegible]). Thies seems toindicate that average achievers in the audio mode will significantly not show the same achievement in contents memorization under the graphic mode.

In analysing achievement under this same mode in the average group in different learning areas, we find a great similarity in theresults in pronunciation and structure as well as content. All three are negatively significant, which can be interpreted that the average student(C-range 77-84 p/ percent) can with high significance be predicted to achieve unor the graphic mode in sentence learning the reverse of his achievement in wrd learning under the audio mode.

Correlation between Word Learning Audio Mode and Sentence Learning in the Top Group (Audio Performance)

An analysis of our scores shows highly significant poitive correlation between audio and pictorial word learning (Phase 1) as contrased to a highly significant negative correlation between audio word learning ad graphic word learning. The correlation between audio word learning and pictrial sentence learning is highly significant in structure as well as pronunciation but not quite significant in content. The highest positive correlation in this group of students (and for that matter of any group and any mode in the entire analysis) can be found between the audio word learning and the combined sentence learning in the area of structure. From this it can be concluded that top achievers in the audio mode of word learning will significantly match their performance in sentence learning under the pictorial and as far as structural features are concerned especially under the combined mode.

Third Question:

WHICH PREFERENCES ARE MOST EFFECTIVE UNDER THEIR OWN LEARNING MODE IN PRONUNCIATION, STRUCTURE, AND CONTENT?

Our investigation of this question included the following three studies:

A) (Analysis of Covariance) The analysis of the effects of each learning mode on the several groups of preference learners;

B) (Analysis of Variance) The analysis of the reaction of each preference group to the various learning modes;

C) The analysis of correlation between performance under the audio learning mode (Phase 1) and performance under the other learning modes (Phases 1 and 2).

Part A and Part B differ in point of view. In part A we effectively choose a learning mode and examine the variation between preference groups in test scores under this mode. In part B, we choose a preference group and examine the variation between test scores in the various learning modes for this group.

In other words, in Part A we are attempting to discover how much influence any given learning mode will have on students in general. In Part B we wish to know how strongly a student is influenced by his preference.

While parts A and B of our investigation in answer to the 3rd question were based on the analyses of covariance and variance, Part C was based on the correlation coefficients between audio word learning (Phase 1) and pictorial, graphic and combined word learning on the one hand and between audio word learning (Phase 1) and pictorial, graphic and combined sentence learning (Phase 2) on the other hand. This investigation was done

a) in a general analysis, for all subjects, and

b) in three achievement groups, the percentage scores of which were prorated for three ranges of achievement (top group: 85 - 100; middle group 77 - 84; bottom group: below 77).

ANALYSIS OF COVARIANCE

Discussion

In discussing the reaction of the various groups of preference learners to the different modes we see that all groups, or in other words, most subjects, whatever their preference, showed approximately the same achievement under the combined mode while they varied considerably under the other modes. *)

It is interesting to note, however, that the combined is the only mode in which the F is regularly not significant and the pictorial mode is the only one which is consistently significant. Significance at the 5 to 6 p.c. level was apparent in the pictorial test for the linguistic mixed group, the statistic pure goups, the statistic mixed group in structure. In content also the statistic mixed and the linguistic mixed groups showed significance at the 5 p.c. level.

The fact that the pure preference groups as well as the mixed showed this significance in structure and the fact that the reaction to the graphic mode also was significant in structure seems to indicate two things:

Retention and achievement in structural formations of language is based on the effective perceptualisation and conceptualisation of the meaning of a verbal construct which is associated or correlated with the sound and intonation pattern of this construct. The reproduction of the general contents of the conversational situations tested was significantly different in the various preference groups of learners in their reactions to the pictorial stimulus. From this it can be concluded that pictorial aids are highly beneficial to pictorial learning types, but at least not to the same degree for different learning types who associate and retain meaning frequently through sound and intonation imagery as wil as abstract memorisation ability not aided through pictorial stimuli.

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*) That means that this mode does not really effect maximum achievement, it is least discrimnty. discriminatory

In the reproduction of structural phenomena this difference in learning capacity was also demonstrated.

The experimenters observed in their interviews with students that certain sound images as well as rhythmic patterns were retained through onomatopoeic associations as well as contrastive sound imagery with related phonemic combinations in their mother tongue without resorting to the pictorial image. Examples in word learning were, for instance, "Schweif"

and in structure learning

Sind Sie schon lange in Rossbach?

In this connection it will be interesting to investigate the positive and negative influence of sound patterns as well as intonation systems on the capacity of different sensory image types of language learners. The factor of linguistically predictive difficulties in audio-comprehension as well as oral reproduction of contrastive sound phenomena as seen, for instance, in the absence of certain sound clusters or stress and pitch characteristics (See DeLattre's recent study in the intonation systems of English, French and German *) must be carefully considered in such an investigation.

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*) Cf Bibliography (90a)

ANALYSIS OF COVARIANCE IN THE DIFFERENT LEARNING AREAS

LEGEND:

Y = S.S.Y (in learning area and respective mode indicated)
X = S.S.X (average score over four modes Phase 1)
B = regression co-efficient
XY = sum of products
DF = degree of freedom
MS = mean square
F = ratio of variance

TABLE 1

PRONUNCIATION **Pictorial Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	435.803	-29.600	8.222	2351.793	3.	783.931	
Within	4461.029	713.193	219.128	1169.751	5.	233.950	
Total	4896.832	683.593	227.350	3521.545	8.	440.193	3.350

B = 1.913

LINGUISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	288.044	-70.236	40.673	1677.757	3.	559.252	
Within	4657.880	846.061	391.059	2007.560	9.	223.062	
Total	4945.924	775.825	431.732	3685.318	12.	307.109	2.507

B = 1.101

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	604.408	18.642	64.603	1843.472	3.	614.490	
Within	4317.649	713.619	274.526	1774.604	7.	253.514	
Total	4922.057	732.261	339.129	3618.077	10.	361.807	2.423

B = 1.033

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	598.768	6.745	44.751	1265.523	3.	421.841	
Within	4755.822	853.620	405.355	2642.373	11.	240.215	
Total	5354.590	860.365	450.106	3907.897	14.	279.135	1.756

B = 1.535

TABLE 2

PRONUNCIATION **Graphic Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	135.802	21.395	8.222	2783.491	3.	927.830	
Within	7216.981	1033.858	219.128	2219.307	5.	443.861	
Total	7352.783	1055.253	227.350	5002.799	8.	625.349	2.090

B = 4.339

LINGUISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	482/330	133.830	40.673	2011.884	3.	670.628	
Within	8652.616	1372.042	391.059	3785.726	9.	420.636	
Total	9134.946	1505.872	431.732	5797.611	12.	483.134	1.594

B = 3.285

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	978.130	247.472	64.603	3044.806	3.	1014.935	
Within	7427.466	1072.467	274.526	2420.442	7.	345.777	
Total	8405.596	1319.939	339.129	5465.249	10.	546.524	2.935

B = 3.076

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	1139.150	220.737	44.751	2909.700	3.	936.566	
Within	8428.690	1348.642	405.355	3227.539	11.	293.412	
Total	9567.840	1569.379	450.106	6037.240	14.	431.231	3.191

B = 2.632

TABLE 3

PRONUNCIATION **Combined**

LINGUISTIC PURE GROUPS

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	152.368	-2.166	8.222	250.387	3.	83.462	
Within	1729.623	287.896	219.128	1273.402	5.	254.680	
Total	1881.991	285.730	227.350	1523.790	8.	190.473	.327

B = .940

LINGUISTIC MIXED GROUPS

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	240.409	73.783	40.673	213.488	3.	71.149	
Within	2633.621	387.099	391.059	2207.242	9.	245.249	
Total	2874.030	460.882	431.732	2420.691	12.	201.724	.290

B = .669

STATISTIC PURE GROUPS

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	97.197	-60.876	64.603	535.878	3.	178.626	
Within	2357.193	461.241	274.526	1455.366	7.	207.909	
Total	2454.390	400.365	339.129	1991.245	1o.	199.124	.859

B = 1.655

STATISTIC MIXED GROUP

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	75.099	53.595	44.751	93.740	3.	31.246	
Within	3119.675	433.022	405.355	2605.885	11.	236.898	
Total	3194.774	486.617	450.106	2699.626	14.	192.830	.131

B = .828

TABLE 4

STRUCTURE **Pictorial Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	357.785	-42.388	8.222	2501.642	3.	833.880	
Within	5046.543	842.936	219.128	1325.733	5.	265.140	
Total	5404.328	800.548	227.350	3827.375	8.	478.421	3.144

B = 2.999

LINGUISTIC MIXED GROUPS

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	223.741	-82.490	40.673	2101.414	3.	700.471	
Within	5650.072	1153.987	391.059	1863.850	9.	207.094	
Total	5873.813	1071.497	431.732	3965.265	12.	330.438	3.382

B = 2.445

STATISTIC PURE GROUPS

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	757.153	5.559	64.603	2512.468	3.	837.489	
Within	4885.534	936.352	274.586	1388.834	7.	198.404	
Total	5642.687	941.811	33 9.129	3901.303	10.	390.130	4.221

B = 3.091

STATISTIC MIXED GROUPS

Source	Y	XY	Y	Y-BX	DF	MS	F
Prefs	739.565	-14.815	44.751	2235.261	3.	745.088	
Within	5951.433	1189.565	405.355	2336.679	11.	212.425	
Total	6690.998	1174.750	450.106	4571.941	14.	326.567	3.507

B = 2.684

TABLE 5

STRUCTURE **Graphic Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	280.329	48.000	8.222	3130.944	3.	1043.648	
Within	7234.802	1058.890	219.128	2067.060	5.	413.412	
Total	7515.131	1106.890	227.350	5198.005	8.	649.750	2.524

B = 4.683

LINGUISTIC MIXED GROUP

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	769.766	176.926	40.673	2662.862	3.	887.620	
Within	8134.285	1433.728	391.059	2871.601	9.	319.066	
Total	8904.051	1610.654	431.732	5534.464	12.	461.205	2.781

B = 3.696

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	581.551	193.708	64.603	3252.692	3.	1084.230	
Within	7731.614	1196.575	274.526	2149.125	7.	307.017	
Total	8313.165	1390.283	339.129	5401.818	10.	540.181	3.531

B = 3.871

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Refs	853.171	194.511	44.751	3186.755	3.	1062.251	
Within	8701.990	1521.478	405.355	2700.881	11.	245.534	
Total	9555.161	1715.989	450.106	5887.637	14.	420.545	4.326

B = 3.336

TABLE 6

STRUCTURE **Combined Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	419.168	37.362	8.222	362.249	3.	120.749	
Within	1175.035	294.145	219.128	762.292	5.	152.458	
Total	1594.203	331.507	227.350	1124.542	8.	140.567	.792

B = 1.162

LINGUISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	805.753	164.745	40.673	478.848	3.	159.616	
Within	1881.960	413.231	391.059	1436.963	9.	159.662	
Total	2687.713	577.976	431.732	1915.812	12.	159.651	.999

B = .95)

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	328.860	-27.500	64.603	619.443	3.	206.147	
Within	1905.281	512.132	274.526	934.121	7.	133.445	
Total	2238.141	484.632	339.129	1552.565	10.	155.256	1.544

B = 1.925

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	411.271	96.521	44.751	268.598	3.	89.532	
Within	2479.737	509.881	405.355	1809.145	11.	164.467	
Total	2891.008	606.402	450.106	2077.744	14.	148.410	.544

B = 1.208

TABLE 7

CONTENT **Pictorial Mode**

LINGUISTIC PURE GROUP

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	659.722	-48.694	8.222	3096.686	3.	1032.228	
Within	5000.001	800.645	219.128	1062.743	5.	212.548	
Total	5659.723	751.951	227.350	4159.430	8.	519.929	4.856

B = 2.293

LINGUISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	391.026	-95.165	40.673	2858.952	3.	952.984	
Within	5979.167	1190.706	391.059	1489.580	9.	165.508	
Total	6370.193	1095.541	431.732	4348.533	12.	362.377	5.757

B = 1.861

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	1332.387	123.858	64.603	2563.283	3.	854.427	
Within	6437.500	1536.357	274.526	1692.373	7.	241.767	
Total	7769.887	1660.215	339.129	4255.656	10.	425.565	3.534

B = 2442

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	793.155	13.194	44.751	2483.805	3.	827.935	
Within	5915.179	1157.358	405.355	2043.847	11.	185.804	
Total	6708.334	1170.552	450.106	4527.653	14.	323.403	4.455

B = 2.832

TABLE 8

CONTENT **Graphic Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	138.888	22.626	8.222	2404.230	3.	801.410	
Within	6562.501	959.952	219.128	2125.678	5.	425.15	
Total	6701.389	982.578	227.350	4529.909	8.	566.23	1.885

B = 3.755

LINGUISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	525.645	140.548	40.673	1791.539	3.	597.179	
Within	8164.167	1292.995	391.059	3679.939	9.	408.88	
Total	8689.812	1433.543	431.732	5471.478	12.	455.956	1.460

B = 2.816

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	645.577	202.041	64.603	2464.769	3.	821.590	
Within	7195.313	1047.016	274.526	2610.435	7.	372.919	
Total	7840.890	1249.057	339.129	5075.205	10.	507.520	

B = 3.097

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	1000.740	207.917	44.751	2344.450	3.	781.483	
Within	7957.600	1294.884	405.355	3262.559	11.	296.596	
Total	8958.340	1502.801	450.106	5607.010	14.	400.500	2.634

B = 2.530

TABLE 9

CONTENT **Combined Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	34.722	5.212	8.222	294.006	3.	98.002	
Within	2395.834	259.178	219.128	1831.428	5.	366.285	
Total	2430.556	264.390	227.350	2125.434	8.	265.679	.267

B = .592

[illegible]

LINGUISTIC MIXED GROUP

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	400.641	122.979	40.673	311.528	3.	103.842	
Within	4166.667	616.111	391.059	3040.844	9.	337.871	
Total	4567.308	739.090	431.732	3352.373	12.	279.364	.307

B = 1.014

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	185.369	30.695	64.603	677.241	3.	225.747	
Within	3507.813	514.198	274.526	2166.721	7.	309.531	
Total	3693.182	544.893	339.129	2843.963	10.	284.396	.729

B = 2.011

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	311.103	98.459	44.751	332.270	3.	110.756	
Within	4584.734	634.291	405.355	3408.671	11.	309.879	
Total	4895.837	732.750	450.106	3740.942	14.	267.210	.357

B = 1.246

TABLE 13

GENERAL **PICTORIAL Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	465.995	-40.227	8.222	2581.063	3.	860.354	
Within	4755.585	785.593	219.128	1152.299	5.	230.459	
Total	5221.580	745.366	227.350	3733.363	8.	466.670	3.733

B = 2.402

LINGUISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	291.833	-82.628	40.673	2099.302	3.	699.767	
Within	5269.393	1063.584	391.059	1724.335	9.	191.592	
Total	5561.226	980.956	431.732	3823.638	12.	318.636	3.652

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	770.878	42.793	64.603	2209.872	3.	736.624	
Within	4623.883	826.058	274.526	1574.639	7.	224.948	
Total	5394.761	868.851	339.129	3784.512	10.	378.451	3.274

B = 2.489

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	704.924	1.711	44.751	1882.832	3.	627.610	
Within	5346.092	1066.847	405.355	2243.562	11.	203.960	
Total	6051.016	1068.558	450.106	4126.395	14.	294.742	3.077

B = 2.150

TABLE 11

GENERAL **Graphic Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	147.781	30.674	8.222	2702.704	3.	900.91	
Within	6922.216	1017.586	219.128	2082.959	5.	416.91	
Total	7069.997	1048.260	227.350	4785.664	8.	598.28	2.162

B = 4.259

LINGUISTIC MIXED GROUP

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	575.778	150.439	40.673	2097.886	3.	699.25	
Within	8124.387	1366.254	391.059	3303.787	9.	367.07	
Total	8700.165	1516.693	431.732	5401.674	12.	450.19	1.904

B = 3.266

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	722.812	214.408	64.603	2846.990	3.	948.96	
Within	7307.344	1105.351	274.526	2303.739	7.	329.15	
Total	8030.156	1319.759	339.129	5150.730	10.	515.03	2.883

B = 3.348

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	991.830	207.723	44.751	2690.365	3.	896.718	
Within	8149.130	1388.332	405.355	2922.234	11.	265.657	
Total	9140.960	1596.055	450.106	5612.600	14.	400.910	3.375

B = 2.906

TABLE 12

GENERAL **Combined Mode**

LINGUISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	148.389	13.469	8.222	206.725	3.	68.908	
Within	1684.810	280.406	219.128	1246.777	5.	249.355	
Total	1833.199	293.875	227.350	1453.503	8.	181.687	.276

B = .898

LINGUISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	440.775	120.502	40.673	241.584	3.	80.528	
Within	2717.100	472.145	391.059	2103.305	9.	233.700	
Total	3157.875	592.647	431.732	2344.890	12.	195.407	.344

B = .878

STATISTIC PURE GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	159.389	-19.278	64.603	517.007	3.	172.335	
Within	2452.283	495.857	274.526	1427.976	7.	203.996	
Total	2611.672	476.629	339.129	1944.984	10.	194.498	.844

STATISTIC MIXED GROUPS

Source	Y	XY	X	Y-BX	DF	MS	F
Prefs	242.125	82.858	44.751	139.892	3.	46.630	
Within	3180.912	525.730	405.355	2460.978	11.	223.725	
Total	3423.037	608.588	450.106	2600.871	14.	185.776	.208

B = 1.094

T hird Question: B) Analysis of Variance.

Pictorial Preference Group

According to our analysis of variance the learning mode does not significantly influence the achievement of the pictorial preference learners in any of the skills tested. If we compare this result with the data obtained (Cf. p. 109) from our Cross Analysis of Audio Results (Phase 2), we notice that there the highest correlation coefficients occurred in structural learning under the pictorial mode. Our analysis of variance, therefore, seems to confirm a definite correlation of achievement of pictorial preference learners under the audio and under the pictorial mode. This of course can be understood in the light of the fact that in each mode of Phase 2 audio performance represented the terminal behavior. (See: Testing Procedure).

As a practical conclusion for aptitude testing and programming of remedial learning, this would lead us to believe that once we have established the pictorial preference of a given student, we should then consider his IQ (verbal intelligence). We assume that in the cases of high intelligence the mode will hot influence achievement greatly. If the pictorial learner, however, demonstrates low intelligence, the teaching mode will drastically change his achievement (favoring him with pictorial aids and reducing his achievement with other stimuli; the audio stimulus, nevertheless, being subject to careful programming and progressively increasing intensity, retains its essential importance.).

This is an interesting finding if we compare this prediction with the greater restriction in predicting learning achievement for the combined preference learners. Those, as we have seen, are indeed very much influenced by a change of mode.

It remains to be investigated whether the combined preference group includes a majority of average achievers who need all the stimuli guaranteed in their preference mode. In other words, the combined preference group may be identified with a specific IQ-range (or respective range of verbal intelligence), which cannot be said for the pictorial preference group which incorporates a wide range of fluctuation in verbal intelligence. An indication of this can be seen in the fact that the highest and the lowest achievers among the subjects tested were both included in the pictorial preference group (See: Classification of Students into Preference Groups), while in the combined group we have a number of students who don't show great variations in their achievement (average achievers).

COMBINED PREFERENCE GROUP

The combined preference group seems to consist of several main sub-groups.

1. Individuals who show an average efficiency in their audio and visual perception skills but in general are neither high-achievers nor underachievers. This may be correlated with a respective range of average intelligence values and an average range of verbal intelligence. This assumption, however, needs careful validation w which was not possible in this experiment. In pronunciation this learning type seems to be most susceptible to changes in learning mode. This was indicated by the significant F of 3.794. There was also a trend in the same direction in the content area (F = 2.413, significance at the 10 p.c. level).
From these results it can be concluded that the students' learning ability with reference to memorisation of content matter as well as imitative and associative skills in the audiolingual performance is dependent upon the combination of picture and sound as essential learning aids.

Since all individuals in the combined preference group also showed high performances under the pictorial learning mode it can be assumed that the graphic element included in the combined learning mode is not the essential factor in the students' preferential association process. In most cases, as a matter of fact, the scores under the pictorial mode were very close to those under the combined.
The addition of the graphic element in this mode may have satisfied a habit acquired by some individuals through extensive one-sided past learning experience. This acquired habit is probably also carried into the learning area of pronunciation, simply because these learning types are lacking sufficient support from their inadequate audioskill. In order to make up for this deficiency the student clings to the verbal image as a potential aid to memorisation.

In German, obviously, this tendency is more rewarded than in many other languages because of the consistent graphic correlation of sound image and graphic symbolisation represented in the relatively systematic writing system of that language. In further tests it might be advisable to investigate into the incorporation of the graphic element in a combined teaching method at various degrees of quantity, that means that the verbal image may be included in spaced intervals and gradually'faded out' until the terminal behavior is reached without maintaining this "crutch" of graphemic support. Verbal image symbols in such a procedure might also be used in the forms of phonetic symbols, at least to some degree necessary for an essential contrastive analysis. It certainly would not be advisable to use graphemes for languages with highly variable and complicated writing systems which provide little or no help in a uniform and systematic correlation of sound and signal. Because if graphic symbolisation of a non-phonetic type were used in -let's say - teaching English to French speakers or vice versa - the association skills of the student would be one-sidedly geared to the dominating influence of graphemic symbolisation; the already lower degree of audio-skill present in the majority of combined preference learners would even be diminished. All these presumptions, of course, are made in view of the learning objective as primarily consisting of the audiolingual competence in the language as the first goal in an elementary teaching program.

The reaction of combined learners to the achievement in learning tasks of reading and writing skills which can also be effectively strengthened through language lab practice at advanced learning stages is a different matter. In that phase of the learning process combined learners might need a greater amount of graphemic stimuli incorporated into a combined learning mode and draw greater benefit from these because a firm proficiency in memorisation, retention and reproduction of sound images of phonemic as well as rhythmic stress patterns will already have been established.

Graphic Preference Learners and No Preference Learners

From our results we could not establish a group of graphic preference learners, a fact which might be recurrent in similar experiments on a larger scale. We assume that in any case, the graphic preference learners will only amount to a small minority.

With regard to the no-preference learners, our analysis of variance seemed to verify our classification. The students who did appear to have no preference were, in general, underachievers in sentence learning (See: Percentage Scores and Classification Charts). Again the investigation of possible correlation of underachievement, non-preference, and general IQ ranges might be interesting in further experiments.

ANALYSIS OF VARIANCE (PERFORMANCE OF PREFERENCE GROUPS) IN THE DIFFERENT MODES

LEGEND:

A group designated Linguistic means that the selections was made on the basis of a careful analysis of the student's performance in phase 1, considering the interrelated linguistic factors.

A group designated Statistic means that the selection was made on the basis of an analysis of the student's variation ins scores.

A group designated Pure means that the students in the group showed a clear preference for that particular mode above all others.

A group designated Mixed includes the "pure" preference students as well as those who show a preference for this mode among others.

LINGUISTIC PURE GROUPS Pictorial Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	484.349	2.	242.174	
Within	8989.384	6.	1498.224	
Total	9473.697	8.	1184.212	.161

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	515.829	2.	257.914	
Within	8910.136	6.	1485.022	
Total	9425.965	8.	1178.245	.173

CONTENT

Source	SUMSQ	DF	MS	F
Modes	451.389	2.	225.694	
Within	9895.834	6.	1649.305	
Totall	10347.223	8.	1293.402	.136

GENERAL

Source	SUMSQ	DF	MS	F
Modes	471.733	2.	235.866	
Within	9239.344	6.	1539.890	
Total	9711.077	8.	1213.884	.153

LINGUISTIC PURE GROUPS Combined Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	93.340	2.	46.670	
Within	2551.621	6.	425.270	
Total	2644.961	8.	330.620	.109

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	58.122	2.	29.061	
Within	2800.054	6.	468.175	
Total	2867.176	8.	358.397	.062

CONTENT

Source	SUMSQ	DF	MS	F
Modes	138.888	2.	69.444	
Within	1875.001	6.	312.500	
Total	2013.889	8.	251.736	.222

GENERAL

Source	SUMSQ	DF	MS	F
Modes	82.606	2.	41.303	
Within	2319.678	6.	386.613	
Total	2402.284	8.	300.285	.106

LINGUISTIC PURE GROUPS No Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	108.869	2.	54.434	
Within	1866.664	6.	311.110	
Total	1975.533	8.	246.941	.174

STRUCTURE

			MS	
Source	SUMSQ	DF	212.973	F
Modes	425.946	2.	289.531	
Within	1737.190	6.	270.392	
Total 1	2163.136	8.		.735

CONTENT

Source	SUMSQ	DF	MS	F
Modes	138.888	2.	69.444	
Within	2187.501	6.	364.583	
Total	2326.389	8.	290.798	.190

GENERAL

Source	SUMSQ	DF	MS	F
Modes	197.617	2.	98.808	
Within	1803.589	6.	300.598	
Totall	2001.206	8.	250.150	.328

LINGUISTIC MIXED GROUPS Pictorial Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	908.402	2.	454.201	
Within	10372.588	12.	864.382	
Total	11280.990	14.	805.785	.525

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	868.310	2.	434.155	
Within	9936.898	12.	828.074	
Total	10805.208	14.	771.800	.524

CONTENT

Source	SUMSQ	DF	MS	F
Modes	1187.504	2.	593.752	
Within	12312.506	12.	1026.042	
Total	13500.010	14.	964.286	.578

GENERAL

Source	SUMSQ	DF	MS	F
Modes	978.161	2.	489.080	
Within	10686.286	12.	890.523	
Total	11664.447	14.	833.174	.549

LINGUISTIC MIXED GROUPS Combined Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	336.075	2.	168.037	
Within	3704.865	12.	308.738	
Total	4040.940	14.	288.638	.544

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	283.938	2.	141.969	
Within	3992.229	12.	332.685	
Total	4276.167	14.	305.440	.426

CONTENT

Source	SUMSQ	DF	MS	F
Modes	583.337	2.	291.668	
Within	3750.003	12.	312.500	
Total	4333 340	14.	309.524	.933

GENERAL

Source	SUMSQ	DF	MS	F
Modes	380.314	2.	190.157	
Within	3612.005	12.	301.750	
Total	4001.319	14.	285.808	.630

LINGUISTIC MIXED GROUPS No Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	108.869	2.	54.434	
Within	1866.664	6.	311.110	
Total	1975.533	8.	246.941	.174

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	425.946	2.	212.973	
Within	1737.190	6.	289.531	
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Source	SUMSQ	DF	MS	F
Modes	138.888	2.	69.444	
Within	2187.501	6.	364.583	
Total	2326.389	8.	290.798	.190

GENERAL

Source	SUMSQ	DF	MS	F
Modes	197.617	2.	98.808	
Within	1803.589	6.	300.598	
Total	2001.206	8.	250.150	.328

STATISTIC PURE GROUPS Pictorial Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	666.577	2.	333.288	
Within	11055.723	12.	921.310	
Total	11722.300	14.	837.307	.361

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	821.611	2.	410.805	
Within	10208.517	12.	850.709	
Total	11030.128	14.	787.866	.482

CONTENT

Source	SUMSQ	DF	MS	F
Modes	1020.837	2.	510.418	
Within	11687.500	12.	973.958	
Total	12708.337	14.	907.738	.524

GENERAL

Source	SUMSQ	DF	MS	F
Modes	803.582	2.	401.791	
Within	10848.674	12.	904.056	
Total	11652.256	14.	832.304	.444

STATISTIC PURE GROUPS Combined Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	745.282	2.	372.641	
Within	383.159	3.	127.719	
Total	1128.441	5.	225.688	2.917

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	456.682	2.	228.341	
Within	983.135	3.	327.711	
Total	1439.817	5.	287.963	.696

CONTENT

Source	SUMSQ	DF	MS	F
Modes	364.584	2 .	182.292	
Within	1093.750	3.	364.583	
Total 1	1458.334	5.	291.666	.500

GENERAL

Source	SUMSQ	DF	MS	F
Modes	503.225	2.	251.612	
Within	748.566	3.	249.522	
Total	1251.791	5.	250.358	1.008

STATISTIC PURE GROUPS No Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	72.886	2.	36.443	
Within	2663.426	9.	295.936	
Total	2736.312	11.	248.755	.123

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	336.058	2.	168.029	
Within	3330.777	9.	370.086	
Total	3666.835	11.	333.348	.454

CONTENT

Source	SUMSQ	DF	MS	F
Modes	182.291	2.	91.145	
Within	2890.626	9.	321.180	
Total	3072.917	11.	297.356	.283

GENERAL

Source	SUMSQ	DF	MS	F
Modes	172.821	2.	86.410	
Within	2786.270	9.	309.585	
Total	2959.091	11.	269.008	.279

STATISTIC MIXED GROUPS Pictorial Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	603.150	2.	301.575	
Within	12532.810	18.	696.267	
Total	13135.960	20.	656.798	.433

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	810.880	2.	405.440	
Within	11833.540	18 .	657.418	
Total	12644.420	20.	632.221	.616

CONTENT

Source	SUMSQ	DF	MS	F
Modes	1086.310	2.	543.155	
Within	13750.010	18.	763.889	
Total	14836.320	20.	741.816	.711

GENERAL

Source	SUMSQ	DF	MS	F
Modes	814.160	2.	407.080	
Within	12438.020	18.	691.001	
Total	13252.180	20.	662.609	.589

STATISTIC MIXED GROUPS Combined Preference

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	934.288	2.	467.144	
Within	1107.950	9.	123.105	
Total	2042.238	11.	185.658	3.794

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	656.660	2.	328.330	
Within	1968.840	9.	218.760	
Total	2625.500	11.	238.681	1.500

CONTENT

Source	SUMSQ	DF	MS	F
Modes	963.541	2.	481.770	
Within	1796.876	9.	199.652	
Total	2760.417	11.	250.947	2.413

GENERAL

Source	SUMSQ	DF	MS	F
Modes	837.060	2.	418.530	
Within	1451.848	9.	161.316	
Total	2288.908	11.	208.082	2.594

STATISTIC MIXED GROUPS **No Preference**

PRONUNCIATION

Source	SUMSQ	DF	MS	F
Modes	72.886	2.	36.443	
Within	2663.426	9.	295.936	
Total	2736.312	11.	248.755	.123

STRUCTURE

Source	SUMSQ	DF	MS	F
Modes	336.058	2 .	168.029	
Within	3330.777	9.	370.086	
Total	3666.835	11.	333.348	.454

CONTENT

Source	SUMSQ	DF	MS	F
Modes	182.291	2.	91.145	
Within	2890.626	9.	321.180	
Total	3072.917	11.	279.356	.283

GENERAL

Source	SUMSQ	DF	MS	F
Modes	172.821	2.	86.410	
Within	2786.270	9.	309.585	
Total	2959.091	11.	269.008	.279

A CROSS-ANALYSIS OF AUDIO RESULTS OF DIFFERENT PREFERENCE LEARNERS

A) General (all 11 subjects).

B) In achievement groups under the audio mode.

A) Comparison of Audio Results with other Test Results of Phase 1 and 2.

Discussion

Phase 1:

In comparing achievement scores of all subjects under the audio learning mode with those under the other modes in Phase 1, we find that practically no correlation exists between the Audio Mode and the Pictorial or Combined modes. This is what we would have expected under the pictorial, but not necessarily under the combined. The fact that the Audio-Combined correlation shows -.08025 while the pictorial shows .12066 may be interpreted to mean that audio preference learners in general may show very low achievement under the added pictorial stimulus and even less under the combined. The investigators recall occurrences of students' holding their hands in front of their eyes in order to concentrate better and memorize audio stimuli. There are certainly audio preference learners whose achievement in audio reproduction deteriorates progressively with the addition of further stimuli. The subjects in our experiment who demonstrated this tendency may have had a certain limited degree of verbal intelligence as such and the mere fact of audio preference may not be the only factor to cause this. The investigators suggest that further research should try to establish in what relation the degree of verbal intelligence and the degree of diminished achievement stand.

The most striking result of the investigation can be seen in the comparison of audio results with graphic results in word learning. Here we can assume with a fair degree of reliability that students doing well under the audio learning mode will not do so under the graphic, or correspondingly we can say that students doing well under the graphic learning mode we would expect to do poorly under the audio. This again indicates that learning achievement in the audioskill of language performance is preconditioned by previous learning habits established through practice (during twelve years of pre-college education). Underachievement in the audio skills of language learning can never be remedied by exposure to graphic stimuli, but only by added practice in the audio skill itself. This fact seems even to overrule any preference in learning mode and seems to justify the intensive weight which the audiolingual approach puts on oral practice in the elementary stage of language learning.

In analyzing results in word learning in general, we must be aware that, as in all foreign language learning, psychological factors as well as linguistic factors do influence our results. However, in the case of word learning and especially in a transfer situation from English to German, the linguistic factors are more limited and therefore more controllable independent variables than in the case of sentence learning. This can be explained simply through the fact that the general stress and tone pattern (e.g. dynamic accent) are almost entirely the same in English as in German. Perception, retention, and reproduction, therefore, may in the total picture, quantiatively speaking, be influenced by fewer additional factors than in sentence learning. These extraneous linguistic factors, as seen for instance in sound clusters not existing in the mother tongue, or foreign fricatives and differently articulated sonants or sonorants like /x/, /ç/, /ʊ/, /oe/, /ʌ/ and the trilled variant of r /ṛ/ exclusively used in the experiment, were carefully controlled in the vocabulary lists as was the syllabic composition of words (See: Evaluation of Linguistic Criteria). In consequence of this, the students could apply their preference of sensory imagery more directly in word learning than in the learning of structural patterns. Features of rising and falling intonation (or pitch and juncture differences) for instance, as recently investigated by DeLattre
are certainly bound to influence the perceptualization, retention, and reproduction process.

Phase 2:
The analysis of the results under the audio learning mode of Phase 1 with the different learning modes of Phase 2 was made in the three language skills of Pronunciation, Oral Mastery of Structure, and Retention of Content. According to the results, the highest correlation coefficient appears in structural learning under the pictorial mode. This seems to indicate that students doing well under the audio mode in word learning would do well with additional pictorial stimuli in sentence learning. Such a correlation can also be seen in the areas of pronunciation and retention of content. No correlation with the audio results at all could be found in the analysis of achievement under the graphic and combined modes in any learning area. The addition of graphic stimuli does not establish a predictability of correlated performance.

CORRELATION COEFFICIENTS

Test Comparison Two Tests in Phase II

PHASE	LEARNING AREA	MODE	COEFFICIENT	
2	Pronunciation	Pictorial	.12008	individual learning areas and modes
2	Pronunciation	Graphic	.64258	
2	Pronunciation	Combined	.46762 -	
2	Structure	Pictorial	.27379	
2	Structure	Graphic	.74583	
2	Structure	Combined	.60607	
2	Content	Pictorial	.11142	
2	Content	Graphic	.56533 -	
2	Content	Combined	.46931 -	
2	General	Pictorial	.16371	overall learning areas
2	General	Graphic	.72574	
2	General	Combined	.51529 -	
2	Pronunciation	Average	.78100	overall modes in individual learning areas
2	Structure	Average	.68871	
2	Content	Average	.83218	
2	General	Average	.77439	overall-overall general correlation

Comparison of Audio Results with Other Test Results

Phase I Audio Results with	Word Learning	Pictorial	.12066
	Word Learning	Graphic	-.42977 -
	Word Learning	Combined	-.08025
Phase II	Pronunciation	Pictorial	.40560 -
	Pronunciation	Graphic	-.03465
	Pronunciation	Combined	.10207
	Structure	Pictorial	.49560 -
	Structure	Graphic	.04683
	Structure	Combined	.04562
	Content	Pictorial	.41657 -
	Content	Graphic	-.03324
	Content	Combined	-.04164
	General	Pictorial	.44463 -
	General	Graphic	-.00688
	General	Combined	.03054
Test Results in Phase II as a whole			.18009

CORRELATION COEFFICIENTS BETWEEN RESULTS IN WORD LEARNING AUDIO MODE AND THE FOLLOWING LEARNING AREA AND LEARNING MODE

Top Group Students 4-5-6

(Raw Scores above 75)
(Converted Scores above 84)

Word Learning	Pictorial	.95049 *
Word Learning	Graphic	-.99794 *
Word Learning	Combined	.30593
Pronunciation	Pictorial	.71250 *
Pronunciation	Graphic	.41429 -
Pronunciation	Combined	.10401 -
Structure	Pictorial	.79979 *
Structure	Graphic	.37178 -
Structure	Combined	.99993 *
Content	Pictorial	.59603 -
Content	Graphic	.39736 -
Content	Combined	.11470 -
General	Pictorial	.69760 *
General	Graphic	.39122 -
General	Combined	.31467 -

Raw Scores indicate the actual number of points achieved out of a total of 141. Converted Scores indicate score computed from raw score by a two-point linear adjustment (102 high 99, 67 median 80).

CORRELATION COEFFICIENTS BETWEEN RESULTS IN WORD LEARNING AUDIO MODE AND THE FOLLOWING LEARNING AREA AND LEARNING MODE

(Raw Scores between 60 and 75)
(Converted Scores between 77 and 84)

Middle Group Students 3-8-2-9-1

Word Learning	Pictorial	.22684-
Word Learning-	Graphic	.36787-
Word Learning	Combined	-.98825*
Pronunciation	Pictorial	-.77830 *
Pronunciation	Graphic	-.78550 *
Pronunciation	Combined	-.27817 -
Structure	Pictorial	-.58897 -
Structure	Graphic	-.72637 *
Structure	Combined	-.19352 -
Content	Pictorial	-.76062 *
Content	Graphic	-.84988 *
Content	Combined	-.62118 -
General	Pictorial	-.72694 *
General	Graphic	-.79407 *
General	Combined	-.49858 -

CORRELATION COEFFICIENTS BETWEEN RESULTS IN WORD LEARNING AUDIO MODE AND THE FOLLOWING LEARNING AREA AND LEARNING MODE

(Raw Scores below 60)
(Converted Scores below 77)

Bottom Group Students 7-11-10

Word Learning	Pictorial	.99844 *
Word Learning	Graphic	.53293 -
Word Learning	Combined	-.26275 -
Pronunciation	Pictorial	.50001 -
Pronunciation	Graphic	.83061 *
Pronunciation	Combined	-.96017 *
Structure	Pictorial	.56524 -
Structure	Graphic	.98806 *
Structure	Combined	-.94051 *
Content	Pictorial	.49999
Content	Graphic	
Content	Combined	-.49998
General	Pictorial	.52565 -
General	Graphic	.99502 *
General	Combined	-.97593 *

B) Achievement Groups *

Middle Group:

It is notable that the only significant correlation between audio performance in word learning and other modes and learning areas is negative. There is significant negative correlation throughout the different learning disciplines in sentence learning between the audio performance and the pictorial and graphic performance. The most significant negative correlation, however, occurs between audio and combined modes in word learning. This seems to indicate that the average learner who has an audio preference must concentrate on the audio mode in order to learn. His performance is considerably hampered by the addition of both pictorial and graphic media in learning words, and by the addition of either medium in learning longer patterns and sentences. It is further indicated that those who have little audio preference tend to do better with the addition of one of these other media (pictorial or graphic, depending on the individual preference) but are less predictable under the combined mode.

Bottom Group:

Here the correlation is also quite varied. There is a very high positive correlation between word learning under the audio and pictorial modes. The indication is that the students who are poor in audio face little better with the addition of pictorial stimuli. In the sentence learning areas of Phase 2, however, the pictorial performance is not so predictable: in this Phase the graphic coefficient is positive and significant in both structure and pronunciation, the conclusion being that the addition of the graphic stimulus alone is of little aid to the student whose audio performance is poor. Here, however, in the combined mode the correlation to the audio is significantly negative. This would seem to indicate that the student whose audio performance in word learning is poor will face considerably better in learning patterns and sentences with the aid of both additional media.

When it comes to the mere retention of content, this prediction is not certain. The results in the area of content, however, do not give any reliable degree of predictability. Further research will have to strictly separate facts of content which are obviously influenced by ideational learning processes from habit-formed mechanical speech performance. This does not mean that a certain number of these ideational processes, such as analogy and association in language learning, cannot be trained to some extent; however, the performance shown in this experiment was not subsequent to an elaborate training program in these abilities and thus only measured performance under a certain mode in an ad hoc approach. Since we are here dealing with underachievers, it can quite safely be assumed that mere retention of content was to some extent influenced by mental capacity or aptitude and verbal intelligence. The interesting conclusion which may be made, however, is a one which will interest the programmer of remedial materials:

The combined mode does not seem to facilitate retention of content for underachievers in the audio mode, or in other words, additional stimuli for learning types weak in audio comprehension and oral reproduction reduce memorisation ability in the higher processes of verbal thinking.

* For Top Group see p. 80

RAW SCORES
AND PERCENTAGE SCORES

PRIMARY DATA

RAW SCORES : WORD LEARNING (PHASE 1)

STUDENT	AUDIO	PICTORIAL	GRAPHIC	COMBINED
# 1	63	86	77	118
# 2	67	67	78	92
# 3	72	90	83	50
# 4	102	124	48	113
# 5	81	86	78	88
# 6	78	94	85	116
# 7	58	119	73	79
# 8	68	96	93	91
# 9	66	85	54	103
# 10	51	103	72	118
# 11	58	118	95	132
MAX.	144	144	152	151

RA W SCORES : PRONUNCIATION (PHASE 2)

STUDENT	PICTORIAL		GRAPHIC		COMBINED	
# 1	52	53	90	78	80	35
# 2	53	69	98	18	64	58
# 3	0	26	25	0	66	46
# 4	92	71	102	79	95	70
# 5	—	70	—	55	—	85
# 6	78	71	102	78	80	70
# 7	39	71	100	78	94	70
# 8	93	17	67	76	80	26
# 9	38	70	31	44	89	35
# 10	39	71	101	76	93	86
# 11	51	71	102	78	95	63
MAX.	93	71	102	79	95	86

RAW SCORES STRUCTURE (PHASE 2)

STUDENT	PICTORIAL		GRAPHIC		COMBINED	
# 1	14	16	25	27	23	15
# 2	15	23	27	7	16	18
# 3	0	10	8	(	20	18
# 4	32	30	32	35	29	26
# 5	—	29	—	20	—	27
# 6	26	28	32	36	25	25
# 7	10	28	32	35	29	26
# 8	32	20	28	24	20	12
# 9	11	26	11	17	26	13
# 10	11	26	19	36	28	31
# 11	20	30	30	35	29	24
MAX.	32	30	32	36	29	35

RAW SCORES CONTENT (PHASE 2)

STUDENT	PICTORIAL		GRAPHIC		COMBINED	
# 1	50	75	75	100	75	50
# 2	50	100	100	25	50	75
# 3	0	25	25	0	50	50
# 4	100	100	100	100	100	75
# 5	--	100	--	75	--	100
# 6	75	100	100	100	75	75
# 7	25	100	100	100	100	75
# 8	100	25	50	100	75	25
# 9	25	100	50	50	100	50
# 10	25	100	100	100	100	100
# 11	75	100	100	100	100	100
MAX.	100	100	100	100	100	100

INDIVIDUAL PERFORMANCE AS PERCENTAGE OF TOTAL POSSIBLE SCORES ACHIEVED IN THE FOUR TESTS OF PHASE 1 AN THE TWO TESTS OF PHASE 2

STUD.	PHASE 1 (Percent Scores)				PHASE 2 (Percentages)								
	WORD LEARNING				PRONUNCIATION			STRUCTURE			CONTENT		
	Audio	Pict.	Graph.	Comb.	Pict.	Graph.	Comb.	Pict.	Graph.	Comb.	Pict.	Graph.	Comb.
1	44.7	59.6	50.6	78.3	65.280	93.484	62.454	48.541	76.562	61.083	62.500	87.500	62.500
2	46.8	46.6	51.3	60.8	77.086	59.431	67.405	61.770	45.659	53.300	75.000	62.500	62.500
3	51.8	62.5	54.6	33.1	18.309	12.254	61.481	16.666	12.500	60.197	12.500	12.500	50.000
4	72.3	86.2	32.6	24.9	99.462	100.000	90.697	100.000	98.611	87.142	100.000	100.000	87.500
5	57.5	59.8	51.3	51.7	98.590	69.620	98.836	96.667	55.555	77.142	100.000	75.000	100.000
6	55.4	65.3	55.9	76.8	91.935	99.367	82.802	88.958	100.000	78.817	87.500	100.000	75.000
7	41.2	82.7	48.1	52.3	70.967	98.386	90.171	62.291	98.611	87.142	62.500	100.000	87.500
8	47.3	66.6	61.3	60.3	61.971	82.210	57.221	66.666	77.083	51.625	62.500	75.000	50.000
9	66.2	59.0	35.5	68.3	69.725	43.044	67.190	62.187	40.798	63.399	62.500	50.000	75.000
10	56.1	71.5	47.4	78.2	70.967	97.611	98.947	60.520	79.687	92.561	62.500	100.000	100.000
11	41.0	82.0	62.6	87.4	77.419	99.367	86.627	81.250	95.486	84.285	87.500	100.000	100.00

Full and Partial Retention in Sentence Learning

the Four Quartile Ranges of Achievement

51

	First Quartile (0-25%)*		Second Quartile (26-50%)		Third Quartile (51-75%)		Fourth Quartile (76-100%)	
Sense Modality	Full	Partial Retention **)	Full	Partial Retention	Full	Partial Retention	Full	Partial Retention
PICTORIAL	18.2	81.8	36.4	18.2	36.4	0	9.1	0
GRAPHIC	27.3	54.5	27.3	45.5	27.3	0	18.2	0
COMBINED	18.2	72.7	36.4	9.1	27.3	18.2	18.2	0

*) This column represents achievement in retention and partial retention of (0-25%) subject matter.

**) Percents of student population.

See: Explanatory Note on p. 122

Note : A high correlation coefficient would mean that, given a quartile there is little variance in the size of the student population in that quartile between achievement in word learning and in sentence learning under the given mode and degree of retention. We observe that there is a high correlation in full retention under the combined mode and in partial retention under the pictorial mode. In the graphic mode there is fair correlation of percentages of student population in both full and partial retention. An analysis of the actual breakdown shows that this correlation is weakened by a tendency in the student population to be more equally distributed among the first and second (and in full retention, the third) q uartiles in sentence learning than in word learning. In partial retention under the combined mode the correlation of breakdown in the student population is also fair but not significant. Here there is a notable shift of a large segment of the population from the second to the first quartile as the population passes from word learning to sentence learning. This would seem to indicate that the lower average students under the combined mode had considerably more difficulty with sentence learning than with word learning.In full retention, pictorial mode, the correlation is poor. An examination of the distribution of the population here shows a marked emigration from the first and second quartiles into the second and third q uartiles respectively. It seems, therefore, that more students found sentence learning easier than word learning under the pictorialmode.

In conclusion it should be mentioned that under the grapic and combined modes there was a considerable increase in full retenion of sentences noticeable in the fourth q uartile range of student achievement.

Correlation of Full and Partial Retention in Phases 1 and 2 Achieved by Student Populations in Four Quartile Ranges.

Modes	Correlation Coefficients	
	Full Retention	Partial Retention
PICTORIAL	+ 0.429	+ 0.994
GRAPHIC	+ 0.694	+ 0.763
COMBINED	+ 0.999	+ 0.648

OVERALL SCORES IN PHASE 1.GENERAL ACHIEVEMENT SCORES

(1) In Numerical Order:

STUDENT	PER CENT
1	58.301662
2	51.572110
3	50.320145
4	66.216225
5	56.690737
6	63.334790
7	56.029455
8	59.085680
9	52.393627
10	58.303022
11	68.249100

(2) By Achievement Groups:

STUDENT	PER CENT
3	50.320145
2	51.572110
9	52.393627
7	56.029455
5	56.690737
1	58.301662
10	58.303022
8	59.085680
6	63.334790
4	66.216225
11	68.249100

APPENDIX

Test Words Ranked by Degree of Difficulty as Represented in Frequency of Non-Retention*

Test I (Audio-Type)

Group I.		Group II.	
Word	No. of Students	Word	No. of Students
Riemen	7	Wolke	11
Weiche	7	Faden	10
Stirne	7	Kerze	10
Faden	7	Sparre	10
Wange	7	Rübe	9
Kerze	7	Kragen	9
Blatt	7	Mütze	8
Sparre	7	Schweif	8
Holzscheit	7	Rasen	8
Topf	6	Brett	7
Strauch	6	Stirne	7
Brett	6	Wange	7
Kleid	6	Riemen	6
Rauch	6	Stiel	6
Wolke	6	Kleid	5
Kragen	6	Strauch	4
Mütze	5	Weiche	4
Wipfel	5	Blatt	4
Küche	5	Holzscheit	4
Wand	5	Schneide	3
Rübe	5	Wand	3
Schürze	5	Schürze	3
Stiel	4	Topf	2
Schneide	4	Küche	2
Rasen	4	Messer	2
Messer	3	Wipfel	0
Baum	2	Baum	0
Schweif	1	Rauch	0
Oberschenkel	1	Oberschenkel	0
Schnauze	0	Schnauze	0

---

* Non-retention is represented by the number of students who did not know the word on the test.

Test Words Ranked by Degree of Difficulty

as Represented in Frequency of Partial Retention*

Test I (Audio-Type)

Group I.		Group II.	
Word	No. of Students	Word	No. of Students
Schnauze	5	Wipfel	6
Mütze	2	Weiche	6
Küche	2	Küche	4
Rasen	2	Blatt	4
Schweif	1	Stiel	3
Strauch	1	Stirne	3
Brett	1	Holzscheit	3
Schneide	1	Schnauze	3
Wand	1	Topf	2
Kragen	1	Mütze	2
Schürze	1	Schweif	2
Topf	0	Strauch	2
Riemen	0	Brett	2
Stiel	0	Kleid	2
Wipfel	0	Rauch	2
Rübe	0	Oberschenkel	2
Kleid	0	Schneide	1
Baum	0	Wand	1
Weiche	0	Wange	1
Stirne	0	Rasen	1
Faden	0	Kragen	1
Rauch	0	Schürze	1
Wange	0	Riemen	0
Kerze	0	Rübe	0
Blatt	0	Baum	0
Wolke	0	Faden	0
Sparre	0	Kerze	0
Holzscheit	0	Wolke	0
Oberschenkel	0	Sparre	0
Messer	0	Messer	0

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* Partial retention is represented by the numberoof students who made errors on the word on the test.

II

Test Words Ranked by Degree of Difficulty

as Represented in Frequency of Non-Retention

Test II (Pictorial-Type)

Group I.		Group II.	
Word	No. of Students	Word	No. of Students
Blüte	7	Schüssel	9
Rodel	7	Rock	8
Strumpf	6	Tüte	6
Sprosse	6	Sprosse	6
Korb	6	Hals	6
Schirm	6	Kloss	6
Fichte	6	Rodel	5
Hals	6	Fichte	5
Schnalle	5	Schnalle	4
Schüssel	5	Strumpf	4
Stiefel	5	Korb	4
Rock	5	Zaun	4
Spange	4	Stiefel	3
Strickstrumpf	4	Spange	3
Zaun	4	Deichsel	3
Kralle	3	Riss	3
Schwanz	2	Strickstrumpf	3
Tüte	2	Schwanz	2
Deichsel	2	Kralle	2
Riss	2	Schirm	2
Kirche	2	Sessel	2
Ast	2	Loch	1
Kloss	2	Ast	1
Fensterladen	2	Schornstein	0
Schornstein	1	Blüte	9
Loch	1	Klingel	0
Sessel	1	Bauch	0
Mantel	1	Kirche	0
Klingel	0	Mantel	0
Bauch	0	Fensterladen	0

Test Words Ranked by Degree of Difficulty

as Represented in Frequency of Partial Retention

Test II (Pictorial-Type)

Group I.		Group II.	
Word	No. of Students	Word	No. of Students
Tüte	4	Loch	6
Ast	4	Zaun	6
Schwanz	3	Schornstein	5
Spange	3	Bauch	5
Kralle	3	Blüte	4
Kirche	3	Sprosse	4
Schnalle	2	Riss	4
Schüssel	2	Ast	4
Loch	2	Schnalle	3
Deichsel	2	Schwanz	3
Strickstrumpf	2	Spange	3
Zaun	2	Korb	3
Fensterladen	2	Rock	3
Schornstein	1	Strickstrumpf	3
Strumpf	1	Schirm	3
Sprosse	1	Fichte	3
Korb	1	Sessel	3
Klingel	1	Tüte	2
Rock	1	Kralle	2
Riss	1	Deichsel	2
Bauch	1	Rodel	2
Schirm	1	Hals	2
Sessel	1	Kloss	2
Blüte	0	Mantel	2
Stiefel	0	Stiefel	1
Rodel	0	Strumpf	1
Fichte	0	Klingel	1
Hals	0	Kirche	1
Kloss	0	Schüssel	0
Mantel	0	Fensterladen	0

Test Words Ranked by Degree of Difficulty
as Represented in Frequency of Non-Retention
Test III (Verbal Image-Type)

Group I.

Word	No. of Students
Schöpfung	7
Zettel	7
Wicht	7
Gewissheit	6
Lücke	6
Schopf	5
Schlips	5
Schlauch	5
Strahl	4
Karzer	4
Streich	4
Stimme	3
Tölpel	3
Wanze	3
Schubfach	3
Braten	2
Spritze	2
Metzger	2
Schwelle	2
Kringel	2
Hirsch	2
Aberglaube	1
Riese	1
Recke	1
Gicht	1
Böller	1
Dorf	1
Zug	0
Klampfe	0
Salbe	0

Group II.

Word	No. of Students
Strahl	10
Schwelle	10
Schlauch	10
Schubfach	10
Schlips	9
Karzer	9
Streich	9
Lücke	9
Wicht	8
Schöpfung	7
Recke	7
Klampfe	7
Kringel	7
Gicht	6
Gewissheit	5
Salbe	5
Wanze	5
Schopf	4
Böller	4
Metzger	3
Zettel	3
Tölpel	2
Riese	2
Zug	1
Hirsch	1
Stimme	0
Braten	0
Spritze	0
Aberglaube	0
Dorf	0

Test Words Ranked by Degree of Difficulty

as Represented in Frequency of Partial Retention

Test III (Verbal Image-Type)

Group I.

Word	No. of Students
Gicht	4
Spritze	3
Tölpel	3
Klampfe	3
Böller	3
Zug	2
Riese	2
Strahl	2
Schwelle	2
Salbe	2
Wanze	2
Karzer	2
Schubfach	2
Aberglaube	1
Recke	1
Kringel	1
Lücke	1
Hirsch	1
Stimme	0
Braten	0
Schopf	0
Gewissheit	0
Schlips	0
Metzger	0
Schöpfung	0
Zettel	0
Wicht	0
Schlauch	0
Streich	0
Dorf	0

Group II.

Word	No. of Students
Tölpel	6
Zug	5
Riese	4
Zettel	4
Böller	4
Wanze	4
Hirsch	4
Gicht	3
Schopf	2
Schöpfung	2
Klampfe	2
Kringel	2
Salbe	2
Stimme-	1
Braten	1
Spritze	1
Gewissheit	1
Wicht	1
Schlauch	1
Streich	1
Lücke	1
Aberglaube	0
Strahl	0
Schlips	0
Metzger	0
Recke	0
Schwelle	0
Karzer	0
Schubfach	0
Dorf	0

Test Words Ranked by Degree of Difficulty

as Represented in Frequency of Non-Retention

Test IV (Audio-Pictorial-Verbal Type)

Group I.		Group II.	
Word	**No. of Students**	**Word**	**No. of Students**
Schleife	7	Rute	11
Kübel	7	Schleife	9
Tasche	6	Kübel	9
Schnur	6	Gabel	8
Kranz	6	Schnur	5
Rute	6	Stengel	5
Gabel	4	Kranz	5
Latz	4	Latz	5
Dolch	4	Rücken	4
Reifen	4	Krug	4
Zopf	3	Span	4
Dach	3	Dolch	3
Schnabel	3	Reifen	3
Kopf	3	Teller	3
Krug	3	Speiche	2
Absatz	2	Nüstern	2
Docht	2	Maserung	2
Teller	2	Schnabel	2
Pantoffel	2	Pantoffel	2
Nüstern	2	Dach	2
Haube	1	Absatz	2
Balken	1	Zopf	2
Rücken	1	Rist	1
Stengel	1	Kopf	1
Span	1	Balken	1
Rist	1	Haube	1
Maserung	0	Tasche	1
Jäger	0	Docht	1
Speiche	0	Jäger	0
Strampelhose	0	Strampelhose	0

Test Words Ranked by Degree of Difficulty

as Represented in Frequency of Partial Retention

Test IV (Audio-Pictorial-Verbal Type)

Group I.		Group II.	
Word	No. of Students	Word	No. of Students
Speiche	6	Docht	7
Nüstern	5	Strampelhose	6
Stengel	4	Rücken	5
Haube	3	Nüstern	5
Dolch	3	Zopf	4
Reifen	3	Balken	4
Docht	2	Speiche	4
Dach	2	Reifen	4
Pantoffel	2	Dach	3
Schnabel	2	Schnabel	3
Rücken	2	Stengel	3
Strampelhose	2	Dolch	3
Zopf	1	Maserung	2
Absatz	1	Schnur	2
Tasche	1	Kopf	2
Balken	1	Rist	2
Jäger	1	Haube	1
Span	1	Pantoffel	1
Kranz	1	Span	1
Rist	1	Kranz	1
Maserung	0	Krug	1
Teller	0	Latz	1
Gabel	0	Absatz	0
Schnur	0	Teller	0
Schleife	0	Tasche	0
Kübel	0	Gabel	0
Kopf	0	Jäger	0
Krug	0	Schleife	0
Latz	0	Kübel	0
Rute	0	Rute	0

Group I.

Frequency Distribution of Scores (Errors)*

Test I (Audio-Type)

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.	6					1
2.	5			1	1	
3.	1				1	5
4.	7					
5.	4					3
6.	5					2
7.	6			1		
8.	5			1	1	
9.	6				1	
10.	4				1	2
11.	5			1		1
12.	5					2
13.	6					1
14.	2					5
15.	7					
16.	7					
17.	7					
18.	6					1
19.	7					
20.	4			2		1
21.	7					
22.	7					
23.	6					1
24.	6				1	
25.	7					
26.	7					6
27.	1					
28.	5				1	1
29.	3					4
30.				2	3	3

---

*E.G., the word Holzscheit was assigned a score value of 8 representing the 8 phonemes comprising it. A number of students remembered only holz which represents 4 phonemes. These students therefore were classified as having made 4 mistakes. Each phoneme which was pronounced erroneously within a particular word represented 1 error made on this word.

Group II.

Frequency Distribution of Scores (Errors)

Test I (Audio-Type)

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.	2				2	7
2.	8			1	1	1
3.	8			1	1	1
4.	6					5
5.	6				3	2
6.				2	4	5
7.	4				2	5
8.	2			1	3	5
9.	7				2	2
10.	3				1	7
11.	3				1	7
12.	9					2
13.	5				2	4
14.						11
15.	4			2	4	1
16.	7			2	1	1
17.	10					1
18.					2	9
19.	7				1	3
20.	8				1	2
21.	10					1
22.	4			2	2	3
23.	11					
24.	9				1	1
25.	10					1
26.	4	2	1			4
27.					2	9
28.	3				1	6
29.	2					9
30.					3	8

X

Group I

Frequency Distribution of Scores (Errors)

Test II (Pictorial-Type)

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.	1			1		5
2.	5				2	
3.	2		1		2	2
4.	5		1		1	
5.	2			2	2	1
6.	7					
7.	5					2
8.	4		1		2	
9.	6				1	
10.	6				1	
11.	6				1	
12.	3			1	2	1
13.					1	6
14.	1				2	4
15.	2			2		3
16.	5				1	1
17.	2				1	4
18.	7					
19.				1		6
20.	4	1	1			1
21.	4				2	1
22.	6				1	
23.	6					1
24.	2			1	2	2
25.	6					1
26.	2				4	1
27.	2					5
28.	1				1	5
29.	1					6
30.	2				2	3

Group II.

Frequency Distribution Of Scores (Errors)

Test II (Pictorial Type)

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.		1		2	2	6
2.	4			1	2	4
3.	2			1	2	6
4.	9					2
5.	6				2	3
6.				2	2	7
7.	3		1			7
8.	3		1		2	5
9.	4			1		6
10.	6		2	1	1	1
11.	4			3		4
12.	2				2	7
13.					1	10
14.	1			2	4	4
15.	3			1	1	6
16.	8				3	
17.	3				4	4
18.	5			1	1	4
19.					5	6
20.	3				3	5
21.	4			4	2	1
22.	2			1	2	6
23.	5			1	2	3
24.					1	10
25.	6			2		3
26.	1				4	6
27.	6			2		3
28.	2		1		2	6
29.					2	9
30.						11

Group I.

Frequency Distribution of Scores (Errors)

Test III (Verbal Image-Type)

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.	3					4
2.	2					5
3.					2	5
4.	2			2	1	2
5.	3		1	1	1	1
6.	5					2
7.	1				1	5
8.	1				2	4
9.	4				2	1
10.	6					1
11.	5					2
12.	2					5
13.	7					
14.	1				1	5
15.			1	1	1	4
16.	7					
17.	1				4	2
18.	2			1	1	3
19.	2			1		4
20.			1	1		5
21.	7					
22.	1			2	1	3
23.	3		1		1	2
24.	5					2
25.	4		1		1	1
26.	4					3
27.	6				1	
28.	3				2	2
29.	1					6
30.	2				1	4

Group II.

Frequency Distribution of Scores (Errors)

Test III (Verbal-Image Type)

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.					1	10
2.					1	10
3.	1				5	5
4.					1	10
5.	2			3	3	2
6.	4			1	1	5
7.						11
8.	2				4	5
9.	10					1
10.	5	1				5
11.	9					2
12.	3					8
13.	7				2	2
14.	7					4
15.	7			1	1	2
16.	3			1	3	4
17.	6		1		2	2
18.	10				1	1
19.	7		1		1	2
20.	5		1		1	4
21.	8				1	2
22.	4			1	3	3
23.	5				4	2
24.	10			1		
25.	9					2
26.	9				1	1
27.	9				1	0
28.	10					1
29.						11
30.	1			1	3	6

Group I.

Frequency Distribution of Scores (Errors)

Test IV (Audio-Pictorial-Verbal Type)

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.						7
2.	3				1	
3.	2					4
4.	2		1	1		3
5.	3			1	2	2
6.	2					5
7.	6				1	
8.	1				2	3
9.	1			1.		5
10.	4			1		3
11.	2				1	3
12.				1	1	6
13.	3				2	2
14.	6					1
15.	7					
16.	1		1		1	4
17.	7					
18.	2				5	
19.	1			1	3	2
20.			2		4	1
21.	1				1	5
22.					2	5
23.	3					4
24.	6			1		
25.	3					4
26.	4					3
27.	4			1	2	
28.	6					1
29.	1				1	5
30.	4			2	1	

Group II.

Frequency Distribution of Scores (Errors)

Test IV (Audio-Pictorial-Verbal Type).

Word Number	Word not Known	Four Mistakes	Three Mistakes	Two Mistakes	One Mistake	Word Correct
1.	2				2	7
2.	2				4	5
3.	2					9
4.	1			3	4	3
5.	2				3	6
6.	3					8
7.	1					10
8.	1				1	9
9.	1		2		2	6
10.	8					3
11.	2				1	8
12.						11
13.	2		1		2	6
14.	5			1	1	4
15.	9					2
16.	4			2	3	2
17.	9					2
18.	2		1	2	2	4
19.	5		2	1		3
20.	2		2		2	5
21.	4		1			6
22.			2	1	3	5
23.	1				2	8
24.	5				1	5
25.	4			1		6
26.	5				1	5
27.	3				3	5
28.	11					
29.	1				2	8
30.	3				4	4

Group I.

Individual Word Scores

of Test I (Audio-Type)

Word Number	Student 1	2	3	4	5	6	7
1	4	4	4	4	4	0	0
2	1	4	4	4	4	2	4
3	1	0	0	4	0	0	0
4	4	4	4	4	4	4	4
5	4	0	4	4	0	0	4
6	5	5	0	0	5	5	5
7	4	2	4	4	4	4	4
8	4	4	4	4	2	4	1
9	4	1	4	4	4	4	4
10	1	5	5	5	5	0	0
11	4	4	4	4	0	2	4
12	4	4	4	0	4	0	4
13	4	4	4	0	4	4	4
14	3	0	0	3	0	0	0
15	4	4	4	4	4	4	4
16	6	6	6	6	6	6	6
17	5	5	5	5	5	5	5
18	3	0	3	3	3	3	3
19	4	4	4	4	4	4	4
20	5	0	5	5	2	2	5
21	5	5	5	5	5	5	5
22	4	4	4	4	4	4	4
23	5	5	0	5	5	5	5
24	6	6	6	6	6	1	6
25	5	5	5	5	5	5	5
26	8	8	8	8	8	8	8
27	9	0	0	0	0	0	0
28	0	5	5	5	1	5	5
29	5	0	5	5	0	0	0
30	1	1	0	1	0	2	0
Total number of mistakes	122	99	110	115	98	88	103
Total Scores	18	42	30	25	43	53	37

Group II.

Individual Word Scores

Of Test I (Audio-Type)

Word Number	Student 1	2	3	4	5	6
1	0	1	0	0	0	0
2	4	4	4	1	4	0
3	4	0	1	4	4	4
4	4	0	4	4	0	0
5	5	4	1	0	4	4
6	0	0	1	2	0	0
7	0	0	1	0	4	4
8	0	4	4	0	0	2
9	4	4	4	0	1	4
10	5	0	1	5	0	0
11	4	0	0	0	0	0
12	4	4	4	0	0	4
13	4	4	4	0	0	0
14	0	0	0	0	0	0
15	1	4	2	0	1	1
16	1	6	2	0	6	6
17	5	5	5	0	5	5
18	0	1	0	0	0	0
19	4	4	4	0	0	0
20	5	5	0	1	5	5
21	5	0	5	5	5	5
22	1	0	2	4	0	4
23	5	5	5	5	5	5
24	6	6	6	1	6	0
25	5	5	5	5	0	5
26	0	8	4	0	0	0
27	0	0	0	1	0	1
28	1	0	0	0	5	0
29	0	0	0	0	5	5
30	1	0	0	1	0	0
Total number of mistakes	78	74	69	39	60	63
Total Scores	63	66	73	102	81	78

Group II.

Individual Word Scores
of Test I (Audio-Type)

Word Number	Student 7	Student 8	Student 9	Student 10	Student 11
1	0	0	1	4	4
2	4	4	2	4	4
3	4	4	4	2	4
4	0	0	4	4	4
5	4	1	1	4	0
6	1	1	2	1	0
7	1	0	0	4	4
8	0	1	1	0	1
9	4	1	4	0	4
10	5	0	0	0	0
11	1	0	4	4	0
12	4	4	4	4	4
13	4	4	0	1	1
14	0	0	0	0	0
15	4	2	1	4	4
16	6	6	2	6	6
17	5	5	5	5	5
18	0	0	1	0	0
19	1	4	4	4	4
20	0	5	5	5	5
21	5	5	5	5	5
22	1	2	0	4	4
23	5	5	5	5	5
24	6	6	6	6	6
25	5	5	5	5	5
26	8	8	8	4	3
27	0	0	0	0	0
28	5	0	0	5	1
29	0	0	0	0	0
30	0	0	1	0	0
Total number of mistakes	83	73	75	90	83
Total Scores	58	67	66	51	58

Group I.

Individual Word Scores

of Test II (Pictorial-Type)

Word Number	Student						
	1	2	3	4	5	6	7
1	8	2	0	0	0	0	0
2	5	5	1	5	1	5	5
3	5	1	0	5	0	3	1
4	5	5	5	5	3	1	5
5	2	0	4	4	2	1	1
6	5	5	5	5	5	5	5
7	5	0	5	5	0	5	5
8	4	1	1	4	4	3	4
9	5	5	5	5	1	5	5
10	5	5	5	5	1	5	5
11	4	4	4	4	1	4	4
12	5	1	0	5	5	1	2
13	0	1	0	0	0	0	0
14	1	0	0	3	0	1	0
15	2	5	0	5	0	0	2
16	1	3	3	3	3	0	3
17	1	0	3	3	0	0	0
18	4	4	4	4	4	4	4
19	2	0	0	0	0	0	0
20	4	9	9	9	0	9	3
21	1	3	0	3	1	3	3
22	4	4	4	4	1	4	4
23	5	5	0	5	5	5	5
24	5	2	0	5	1	1	0
25	0	4	4	4	4	4	4
26	0	1	1	2	1	1	2
27	0	4	0	4	0	0	0
28	5	0	0	1	0	0	0
29	0	0	6	0	0	0	0
30	10	0	0	0	1	1	10
Total number of mistakes	103	79	69	107	44	72	82
Total Scores	41	65	75	37	100	72	62

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Group II.

Individual Word Scores

of Test II (Pictorial-Type)

Word Number	Student 1	2	3	4	5	6
1	2	4	0	0	1	0
2	1	2	1	5	0	0
3	0	2	5	0	0	5
4	5	5	0	5	5	5
5	4	4	1	1	4	0
6	1	2	2	0	0	0
7	3	5	0	0	5	0
8	4	3	0	1	4	1
9	2	5	5	0	0	5
10	5	5	3	1	3	2
11	0	2	4	4	2	4
12	0	0	5	0	0	0
13	1	0	0	0	0	0
14	1	2	1	1	3	0
15	5	2	5	0	0	0
16	3	3	3	1	3	3
17	3	1	3	1	1	0
18	4	2	4	0	4	0
19	0	1	0	0	1	1
20	0	9	0	0	9	9
21	2	3	1	0	3	1
22	1	1	0	0	0	2
23	0	2	1	0	5	5
24	0	1	0	0	0	0
25	4	4	2	0	4	2
26	0	1	1	0	1	2
27	4	4	2	0	4	2
28	3	1	5	0	5	1
29	0	1	0	0	1	0
30	0	0	0	0	0	0
Total number of mistakes	58	77	54	20	68	50
Total scores	86	67	90	124	86	94

Group II.

Individual Word Scores

of Test II (Pictorial-Type)

Word Number	Student 7	8	9	10	11
1	0	0	1	0	2
2	5	0	5	0	5
3	0	0	1	1	0
4	5	0	5	5	5
5	0	4	4	4	0
6	0	0	1	0	0
7	0	5	0	0	0
8	0	4	0	0	0
9	0	5	0	0	0
10	5	5	5	5	0
11	0	4	2	0	0
12	0	1	1	0	5
13	0	0	0	0	0
14	0	0	2	1	0
15	0	0	5	1	0
16	1	3	3	3	1
17	1	0	3	0	0
18	0	1	4	4	0
19	0	0	1	1	0
20	1	0	1	1	0
21	3	3	2	2	2
22	4	0	0	0	4
23	0	5	5	5	1
24	0	0	0	0	0
25	0	4	4	4	0
26	0	0	0	0	1
27	0	4	4	4	0
28	0	0	0	0	0
29	0	0	0	0	0
30	0	0	0	0	0
Total number of mistakes	25	48	59	41	26
Total scores	119	96	85	103	118

Group I.

Individual Word Scores

of Test III (Verbal Image-Type)

Word Number	Student 1	2	3	4	5	6	7
1	5	0	5	5	0	0	0
2	6	0	0	6	0	0	0
3	0	1	0	0	0	1	0
4	2	6	0	6	0	2	1
5	2	3	0	1	6	6	6
6	0	3	0	3	3	3	3
7	1	9	0	0	0	0	0
8	0	0	0	4	1	0	1
9	5	5	5	0	1	1	5
10	8	8	0	8	8	8	8
11	5	5	0	5	5	0	5
12	0	0	0	0	6	0	6
13	5	5	5	5	5	5	5
14	1	0	4	0	0	0	0
15	3	2	0	0	0	0	1
16	4	4	4	4	4	4	4
17	0	4	1	1	1	1	0
18	1	5	0	5	0	0	2
19	0	2	0	0	6	0	6
20	2	0	0	0	0	0	3
21	4	4	4	4	4	4	4
22	1	2	0	0	2	0	5
23	5	3	5	1	0	0	5
24	4	4	0	4	0	4	4
25	6	3	0	6	6	1	6
26	5	0	5	5	0	5	0
27	4	4	4	4	1	4	4
28	6	6	6	0	1	0	1
29	0	0	0	4	0	0	0
30	1	0	0	4	0	0	4
Total number of mistakes	86	88	48	85	60	49	89
Total Scores	66	64	104	67	92	103	63

Group II

Individual Word Scores

of Test III (Verbal Image-type)

Word Number	Student 1	2	3	4	5	6
1	0	1	0	0	0	0
2	0	0	1	0	0	0
3	1	1	0	3	0	0
4	0	0	0	0	0	0
5	1	1	2	6	0	0
6	0	3	0	3	1	0
7	0	0	0	0	0	0
8	0	1	1	4	1	0
9	5	5	5	5	5	5
10	8	0	0	8	0	0
11	5	5	5	5	5	5
12	0	0	0	6	6	0
13	5	5	5	5	5	0
14	4	0	4	0	4	0
15	6	6	0	6	6	6
16	0	1	4	4	2	0
17	4	4	4	4	3	4
18	5	5	5	5	5	5
19	6	1	6	0	3	6
20	5	3	0	5	0	5
21	4	4	4	4	0	4
22	1	1	0	5	2	1
23	0	1	5	5	1	1
24	2	4	4	4	4	4
25	0	6	0	6	6	6
26	5	5	2	5	5	5
27	1	4	4	0	4	4
28	6	6	6	6	6	6
29	0	0	0	0	0	0
30	1	1	2	0	0	0
Total number of mistakes	75	74	69	104	74	67
Total Scores	77	78	83	48	78	85

Group II.

Individual Word Scores

of Test III (Verbal Image-Type)

Word Number	Student 7	Student 8	Student 9	Student 10	Student 11
1	0	0	0	0	0
2	0	0	0	0	0
3	1	0	1	0	1
4	0	0	1	0	0
5	2	6	3	2	1
6	2	3	3	0	0
7	0	0	0	0	0
8	0	0	1	0	4
9	5	0	5	5	5
10	4	8	8	8	0
11	0	5	5	5	0
12	0	6	0	0	0
13	0	5	5	1	1
14	4	0	4	4	4
15	2	6	1	6	0
16	4	0	1	1	0
17	0	1	4	1	0
18	5	0	5	5	5
19	6	0	6	6	6
20	5	0	5	0	1
21	0	4	4	1	4
22	5	0	5	5	0
23	5	1	5	5	0
24	4	4	4	4	4
25	6	6	6	6	6
26	5	0	5	5	5
27	4	4	4	4	4
28	6	0	6	6	6
29	0	0	0	0	0
30	4	0	1	0	0
Total number of mistakes	79	59	98	80	57
Total Scores	73	93	54	72	95

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): C (+P)

Student No. 1

Sensory Image Type (Phase 2): G (+C)

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	95	100	100	90.91	100	85.71	+	+	+
	0	95.45	0	0	82.50	0	-	+	-
	0	95.55	100	0	100	100	-	+	+
	88.24	0	100	100	0	80	+	-	+
m	45.81	72.75	75	47.73	70.62	66.43	50	75	75

Test II

	100	100	95.24	90	75	100	+	+	+
	92.86	100	0	60	84.61	0	+	+	-
	0	100	93.75	0	72.73	100	-	+	+
	100	90	0	80	50	0	+	+	-
m	73.21	97.50	47.25	57.50	70.58	50	75	100	50

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): A (+P+C)

Student No. 2

Sensory Image Type (Phase 2): (P)

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	97.44	100	90.48	100	100	71.43	+	+	+
	0	100	0	0	62.50	0	-	+	-
	0	97.78	100	0	63.55	84.61	-	+	+
	88.24	66.66	0	100	50	0	+	+	-
m	46.42	91.11	47.62	50	69.01	39.01	50	100	50

Test II

	96.15	100	95.24	70	87.50	71.43	+	+	+
	100	0	0	100	0	0	+	-	-
	94.12	0	100	60	0	87.50	+	-	+
	100	0	95.65	100	0	75	+	-	+
m	97.57	25	72.72	82.50	21.87	58.48	100	25	75

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): P (+G)

Student No. 3

Sensory Image Type (Phase 2): ______

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	0	96.15	100	0	88.89	100	-	+	+
	0	0	0	0	0	0	-	-	-
	0	0	100	0	0	100	-	-	+
	0	0	0	0	0	0	-	-	-
m	0	24.04	50	0	22.22	50	0	25	50

Test II

	100	0	95.24	100	0	85.71	+	-	+
	0	0	100	0	0	100	-	-	+
	0	0	0	0	0	0	-	-	-
	0	0	0	0	0	0	-	-	-
m	25	0	48.81	25	0	46.43	25	0	50

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): P (+A+C)

Sensory Image Type (Phase 2): ____________

Student No. 4

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	100	100	100	100	100	100	+	+	+
	100	100	100	100	100	100	+	+	+
	100	100	100	100	100	100	+	+	+
	94.12	100	100	100	100	100	+	+	+
m	98.53	100	100	100	100	100	100	100	100

Test II

	100	100	100	100	100	100	+	+	+
	100	100	100	100	92.31	91.66	+	+	+
	100	100	0	100	100	0	+	+	-
	100	100	100	100	100	100	+	+	+
m	100	100	75	100	98.08	72.91	100	100	75

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): P (≠A≠C)

Sensory Image Type (Phase 2): ____________

Student No. 5

Test I

Pronunciation			Structure			Content		
M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3

Test II

	100	94.44	100	100	75	71.43	≠	≠	≠
	92.86	100	100	100	76.92	91.66	≠	≠	≠
	100	0	100	90	0	75	≠	-	≠
	100	100	95.65	100	100	62.50	≠	≠	≠
m	98.21	73.61	98.91	97.50	63.98	75.15	100	75	100

XXX

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages

Sensory Image Type (Phase 1: C (+P)

Student No. 6

Sensory Image Type (Phase 2:

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	100	100	100	100	100	100	+	+	+
	95.83	100	0	100	100	0	+	+	-
	0	100	100	0	100	100	-	+	+
	94.12	100	100	100	100	100	+	+	+
m	72.49	100	75	75	100	75	75	100	75

Test II

	100	94.44	100	100	100	85.71	+	+	+
	100	100	100	100	100	91.66	+	+	+
	100	100	0	100	100	0	+	+	-
	100	100	100	100	100	100	+	+	+
m	100	98.61	75	100	100	69.34	100	100	75

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): P (✓G)

Student No. 7

Sensory Image Type (Phase 2): ____________

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	100	100	95.24	90.90	100	100	✓	✓	✓
	0	95.45	100	0	100	100	-	✓	✓
	0	97.78	100	0	100	100	-	✓	✓
	0	100	100	0	100	100	-	✓	✓
m	25	98.31	98.81	22.72	100	100	25	100	100

Test II

	100	94.44	100	100	100	85.71	✓	✓	✓
	100	100	100	60	92.30	100	✓	✓	✓
	100	100	0	100	100	0	✓	✓	-
	100	100	100	100	100	100	✓	✓	✓
m	100	98.61	75	90	98.07	71.43	100	100	75

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): C (≠G)

Student No. 8

Sensory Image Type (Phase 2): ____________

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	100	0	100	100	0	57.14	≠	-	≠
	100	100	100	100	87.50	100	≠	≠	≠
	100	100	97.78	100	100	92.31	≠	≠	≠
	100	0	0	100	0	0	≠	-	-
m	100	50	74.45	100	46.87	62.36	100	50	75

Test II

	0	100	0	0	87.50	0	-	≠	-
	0	100	100	0	92.30	100	-	≠	≠
	100	95.65	0	100	100	0	≠	≠	-
	0	100	0	0	100	0	-	≠	-
m	25	98.91	25	25	94.95	25	25	100	25

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): P (+A)

Sensory Image Type (Phase 2): ____________

Student No. 9

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	97.44	96.15	90.48	100	100	100	+	+	+
	0	0	93.33	0	0	75	-	-	+
	0	0	35.55	0	0	100	-	-	+
	0	66.66	92.86	0	50	60	-	+	+
m	24.36	40.70	93.05	25	37.50	83.75	25	50	100

Test II

	96.15	94.44	90.48	100	87.50	85.71	+	+	+
	100	96.43	0	60	76.92	0	+	+	-
	100	0	100	90	0	87.50	+	-	+
	100	0	0	100	0	0	+	-	-
m	99.04	47.72	47.62	87.50	41.10	43.30	100	50	50

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): P (+C)

Sensory Image Type (Phase 2): __________

Student No. 10

Test I

	Pronunciation			Structure			Content		
	M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
	100	100	100	100	100	85.71	+	+	+
	0	100	93.33	0	87.50	100	-	+	+
	0	97.78	100	0	90.91	100	-	+	+
	0	100	92.86	0	75	100	-	+	+
m	25	99.45	96.55	25	88.35	96.43	25	100	100

Test II

	100	100	100	100	100	100	+	+	+
	100	96.43	100	80	100	100	+	+	+
	100	95.65	100	80	100	100	+	+	+
	100	90	100	80	100	100	+	+	+
m	100	95.52	100	85	100	100	100	100	100

Test I and II (Phase 2)

Retention Scores Achieved through Different Modes of Instruction

(Expressed in Percentages)

Sensory Image Type (Phase 1): C (AP)

Sensory Image Type (Phase 2): ________

Student No. 11

Test I

Pronunciation			Structure			Content		
M_1	M_2	M_3	M_1	M_2	M_3	M_1	M_2	M_3
0	100	100	0	100	100	-	+	+
100	100	100	90.91	87.50	100	+	+	+
92.31	100	100	100	100	100	+	+	+
88.21	100	100	100	75	100	+	+	+
m 70.14	100	100	72.73	90.62	100	75	100	100

Test II

100	100	100	100	87.50	85.71	+	+	+
100	100	100	100	100	91.66	+	+	+
100	100	100	100	100	87.50	+	+	+
100	90	0	100	100	0	+	+	+
m 100	97.50	75	100	96.87	66.22	100	100	100

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 1

Syntactical Units	Pronunciation				Structure			
	I		II		I		II	
	Score	Percent	Score	Percent	Score	Percent	Score	Percent
Test I (Content Questions)								
1.	26	100	26	100	9	100	9	90
2.	37	95	18	100	10	90.91	6	75
3.	21	100	20	95.24	6	85.71	7	100
Total	84	m 98.33	64	m 98.41	25	m 92.21	22	m 88.33
Test II (Response Questions)								
4.	21	95.45	13	92.86	5	82.50	3	60
5.	0	0	28	100	0	0	11	84.61
6.	0	0	0	0	0	0	0	0
Total	21	m 31.82	41	m 64.29	5	m 27.50	14	m 48.20
Test III (Completion Questions)								
7.	45	100	23	100	13	100	8	72.73
8.	14	100	9	90	4	80	2	50
9.	0	0	0	0	0	0	0	0
10.	15	88.24	14	100	4	100	4	80
11.	43	95.55	15	93.75	11	100	8	100
12.	0	0	0	0	0	0	0	0
Total	117	m 63.96	61	m 63.96	32	m 63.33	22	m 50.46
GRAND TOTAL	222	M 64.70	166	M 75.55	62	M 61.01	58	M 62.33

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 2

Syntactical Units	Pronunciation I Score	Pronunciation I Percent	Pronunciation II Score	Pronunciation II Percent	Structure I Score	Structure I Percent	Structure II Score	Structure II Percent
Test I (Content Questions)								
1.	26	100	25	96.15	9	100	7	70
2.	38	97.44	18	100	11	100	7	87.50
3.	19	90.48	20	95.24	5	71.43	5	71.43
Total	83	m 95.97	63	m 97.13	25	m 90.48	19	m 76.31
Test II (Response Questions)								
4.	22	100	14	100	5	62.50	5	100
5.	0	0	0	0	0	0	0	0
6.	0	0	0	0	0	0	0	0
Total	22	m 33.33	14	m 33.33	5	m 20.83	5	m 33.33
Test III (Completion Questions)								
7.	45	100	0	0	11	84.61	0	0
8.	0	0	0	0	0	0	0	0
9.	0	0	16	94.12	0	0	6	60
10.	15	88.24	14	100	4	100	5	100
11.	44	97.78	16	100	7	63.55	7	87.50
12.	6	66.66	22	95.65	2	50	6	75
Total	110	m 58.78	68	m 64.96	24	m 49.69	24	m 53.75
GRAND TOTAL	215	M 62.69	145	M 65.14	54	M 54.50	48	M 54.46

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 3

	Pronunciation				Structure			
Syntactical	I		II		I		II	
Units	Score	Percent	Score	Percent	Score	Percent	Score	Percent
Test I (Content Questions)								
1.	25	96.15	26	100	8	88.89	10	100
2.	0	0	0	0	0	0	0	0
3.	21	100	20	95.24	7	100	6	85.71
Total	46	m 65.38	46	m 65.08	15	m 62.96	16	m 61.90
Test II (Response Questions)								
4.	0	0	0	0	0	0	0	0
5.	0	0	0	0	0	0	0	0
6.	0	0	26	100	0	0	12	100.
Total	0	0	26	33.33	0	0	12	33.33
Test III (Completion Questions)								
7.	45	100	0	0	13	100	0	0
8.	0	0	0	0	0	0	0	0
9.	0	0	0	0	0	0	0	0
10.	0	0	0	0	0	0	0	0
11.	0	0	0	0	0	0	0	0
12.	0	0	0	0	0	0	0	0
Total	45	m 16.66	0	m 0	13	m 16.67	0	m 0
GRAND TOTAL	91	M 27.35	72	M32.80	28	M 26.54	28	M31.74

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 4

Syntactical Units	Pronunciation I Score	Pronunciation I Percent	Pronunciation II Score	Pronunciation II Percent	Structure I Score	Structure I Percent	Structure II Score	Structure II Percent
Test I (Content Questions)								
1.	26	100	26	100	9	100	10	100
2.	39	100	18	100	11	100	8	100
3.	21	100	21	100	7	100	7	100
Total	86	m 100	65	m 100	27	m 100	25	m 100
Test II (Response Questions)								
4.	22	100	14	100	8	100	5	100
5.	15	100	28	100	4	100	12	92.31
6.	24	100	26	100	11	100	11	91.66
Total	61	m 100	68	m 100	23	m 100	28	m 100
Total III (Completion Questions)								
7.	45	100	23	100	13	100	11	100
8.	14	100	10	100	5	100	4	100
9.	13	100	17	100	6	100	10	100
10.	16	94.12	14	100	4	100	5	100
11.	45	100	0	0	11	100	0	0
12.	9	100	23	100	4	100	8	100
Total	142	m 99.02	87	m 83.33	43	m 100	38	m 83.33
GRAND TOTAL	289	M 99.67	220	M 94.44	93	M 100	91	M 92.66

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 5

	Pronunciation				Structure			
Syntactical	I		II		I		II	
Units	Score	Percent	Score	Percent	Score	Percent	Score	Percent
Test I (Content Questions)								
1.			26	100			10	100
2.			17	94.44			6	75
3.			21	100			5	71.43
Total			64	m 98.15			21	m82.14
Test II (Response Questions)								
4.			13	92.86			5	100
5.			28	100			10	76.92
6.			26	100			11	91.66
Total			67	m 97.62			26	m 89.53
Test III (Completion Questions)								
7.			0	0			0	0
8.			10	100			4	100
9.			17	100			9	90
10.			14	100			5	100
11.			16	100			6	75
12.			22	95.65			5	62.50
Total			79	m 82.61			29	m 71.25
GRAND TOTAL			210	M 92.79			76	M 80.97

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student 6

Syntactical	Pronunciation				Structure			
	I		II		I		II	
Units	Score	Percent	Score	Percent	Score	Percent	Score	Percent
Test I (Content Questions)								
1.	26	100	26	100	9	100	10	100
2.	39	100	17	94.44	11	100	8	100
3.	21	100	21	100	7	100	6	85.71
Total	86	m 100	64	m 98.15	27	m 100	24	m 95.24
Test II (Response Questions)								
4.	22	100	14	100	8	100	5	100
5.	0	0	28	100	0	0	13	100
6.	23	95.83	26	100	11	100	11	91.66
Total	45	m 65.28	68	m 100	19	m 66.66	29	m 97.22
Test III (Completion Questions)								
7.	45	100	23	100	13	100	11	100
8.	14	100	10	100	5	100	4	100
9.	0	0	17	100	0	0	10	100
10.	16	94.12	14	100	4	100	5	100
11.	45	100	0	0	11	100	0	0
12.	9	100	23	100	4	100	8	100
Total	129	m 82.35	87	m 83.33	37	m 83.33	38	m 83.33
GRAND TOTAL	260	M 82.54	219	M 93.83	83	M 83.33	91	M 91.93

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 7

Syntactical Units	Pronunciation I Score	Pronunciation I Percent	Pronunciation II Score	Pronunciation II Percent	Structure I Score	Structure I Percent	Structure II Score	Structure II Percent
Test I (Content Questions)								
1.	26	100	26	100	9	100	10	100
2.	39	100	17	94.44	10	90.90	8	100
3.	20	95.24	21	100	7	100	6	85.71
Total	85	m 98.41	64	m 98.15	26	m 96.97	24	m 95.24
Test II (Response Questions)								
4.	21	95.45	14	100	8	100	3	60
5.	15	100	28	100	4	100	12	92.30
6.	0	0	26	100	0	0	12	100
Total	36	m 65.15	68	m 100	12	m 66.67	27	m 84.10
Test III (Completion Questions)								
7.	45	100	23	100	13	100	11	100
8.	14	100	10	100	5	100	4	100
9.	0	0	17	100	0	0	10	100
10.	0	0	14	100	0	0	5	100
11.	44	97.78	0	0	11	100	0	0
12.	9	100	23	100	4	100	8	100
Total	112	m 66.30	87	m 83.33	33	m 66.67	38	m 83.33
GRAND TOTAL	233	M 76.62	219	M 93.83	71	M 76.77	89	M 87.56

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 8

Syntactical Units	Pronunciation				Structure			
	I		II		I		II	
	Score	Percent	Score	Percent	Score	Percent	Score	Percent
Test I (Content Questions)								
1.	0	0	0	0	0	0	0	0
2.	39	100	18	100	11	100	7	87.50
3.	21	100	0	0	4	57.14	0	0
Total	60	m 66.66	18	m 33.33	15	m 52.38	7	m 29.17
Test II (Response Questions)								
4.	22	100	0	0	7	87.50	0	0
5.	15	100	28	100	4	100	12	92.30
6.	24	100	26	100	11	100	12	100
Total	61	m 100	54	m 66.66	22	m 95.83	24	m 64.10
Test III (Completion Questions)								
7.	44	97.78	22	95.65	12	92.31	11	100
8.	0	0	10	100	0	0	4	100
9.	13	100	17	100	6	100	10	100
10.	17	100	0	0	4	100	0	0
11.	45	100	0	0	11	100	0	0
12.	0	0	0	0	0	0	0	0
Total	119	m 66.30	49	m 49.26	33	m 65.39	25	m 50
GRAND TOTAL	240	M 77.65	121	M 49.75	70	M 71.20	56	M 47.74

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 9

Syntactical Units	Pronunciation I Score	Pronunciation I Percent	Pronunciation II Score	Pronunciation II Percent	Structure I Score	Structure I Percent	Structure II Score	Structure II Percent
Test I (Content Questions)								
1.	25	96.15	25	96.15	9	100	10	100
2.	38	97.44	17	94.44	11	100	7	87.50
3.	19	90.48	19	40.48	7	100	6	85.71
Total	82	m 94.69	61	m 93.69	27	m 100	23	m 91.07
Test II (Response Questions)								
4.	0	0	14	100	0	0	3	60
5.	14	93.33	27	96.43	3	75	10	76.92
6.	0	0	0	0	0	0	0	0
Total	14	m 31.11	41	m 65.48	3	m 25	13	m 45.64
Test III (Completion Questions)								
7.	43	95.55	0	0	13	100	0	0
8.	13	92.86	0	0	3	60	0	0
9.	0	0	17	100	0	0	9	90
10.	0	0	14	100	0	0	5	100
11.	0	0	16	100	0	0	7	87.50
12.	6	66.66	0	0	2	50	0	0
Total	62	m 42.51	47	m 50	18	m 35	21	m 46.25
GRAND TOTAL	158	M 56.10	149	M 69.72	48	M 53.33	57	M 60.99

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 10

	Pronunciation				Structure			
Syntactical	I		II		I		II	
Units	Score	Percent	Score	Percent	Score	Percent	Score	Percent
Test I (Content Questions)								
1.	26	100	26	100	9	100	10	100
2.	39	100	18	100	11	100	8	100
3.	21	100	21	100	6	85.71	7	100
Total	86	m 100	65	m 100	26	m 95.24	25	m 100
Test II (Response Questions)								
4.	22	100	14	100	7	87.50	4	80
5.	14	93.33	27	96.43	4	100	13	100
6.	0	0	26	100	0	0	12	100
Total	36	m 64.44	67	m 98.81	11	m 62.50	29	m 93.33
Test III (Completion Questions)								
7.	45	100	22	95.65	13	100	11	100
8.	13	92.86	9	90	5	100	4	100
9.	0	0	17	100	0	0	8	80
10.	0	0	14	100	0	0	4	80
11.	44	97.78	16	100	0	0	4	80
12.	9	100	23	100	3	75	8	100
Total	111	m 65.11	101	m 97.61	31	m 60.96	43	m 93.33
GRAND TOTAL	233	M 76.52	233	M 98.81	68	M 72.90	97	M 95.55

Test I and II (Phase 2)

Individual and Total Retention Scores

and Individual and Mean Percentages

Student No. 11

	Pronunciation				Structure			
Syntactical	I		II		I		II	
Units	Score	Percent	Score	Percent	Score	Percent	Score	Percent
Test I (Content Questions)								
1.	26	100	26	100	9	100	10	100
2.	0	0	18	100	0	0	7	87.50
3.	21	100	21	100	7	100	6	85.71
Total	47	m 66.66	65	m 100	16	m 66.66	23	m 91.07
Test II (Response Questions)								
4.	22	100	14	100	7	87.50	5	100
5.	15	100	28	100	4	100	13	100
6.	24	100	26	100	10	90.91	11	91.66
Total	61	m 100	68	m 100	21	m 92.80	29	m 97.22
Test III (Completion Questions)								
7.	45	100	23	100	13	100	11	100
8.	14	100	9	90	5	100	4	100
9.	12	92.31	17	100	6	100	10	100
10.	15	88.24	14	100	4	100	5	100
11.	45	100	16	100	11	100	7	87.50
12.	9	100	0	0	3	75	0	0
Total	140	m 96.76	79	m 81.67	42	m 95.83	37	m 81.25
GRAND TOTAL	248	M 87.81	212	M 93.89	79	M 85.10	89	M 89.85

Full and Partial Retention of Words in the Four Quartile Ranges of Achievement

	First Quartile (0-25%)*		Second Quartile (26-50%)		Third Quartile (51-75%)		Fourth Quartile (76-100%)	
Sense Modality	Retention**	Partial Retention**	Retention	Partial Retention	Retention	Partial Retention	Retention	Partial Retention
Audio	50	83	50	17	0	0	0	0
Pictorial	28	72.2	50	22	11	5.6	11	0
Graphic	28	89	55.5	11	16.5	0	0	0
Combined	17	50	44.2	44.2	33.3	5.5	5.5	0

*This column represents achievement in retention and partial retention of (0-25%) subject matter.

**Percents of student population.